

VOLUME 3 NUMBER 2 FEBRUARY 1996

os/2[®]

M A G A Z I N E

Reviews
Xtra! Xtra!
Object Desktop

New
os/2[®]
Developer
Section!

Fax Facts

From Workstation
to Fax Server

Page 20

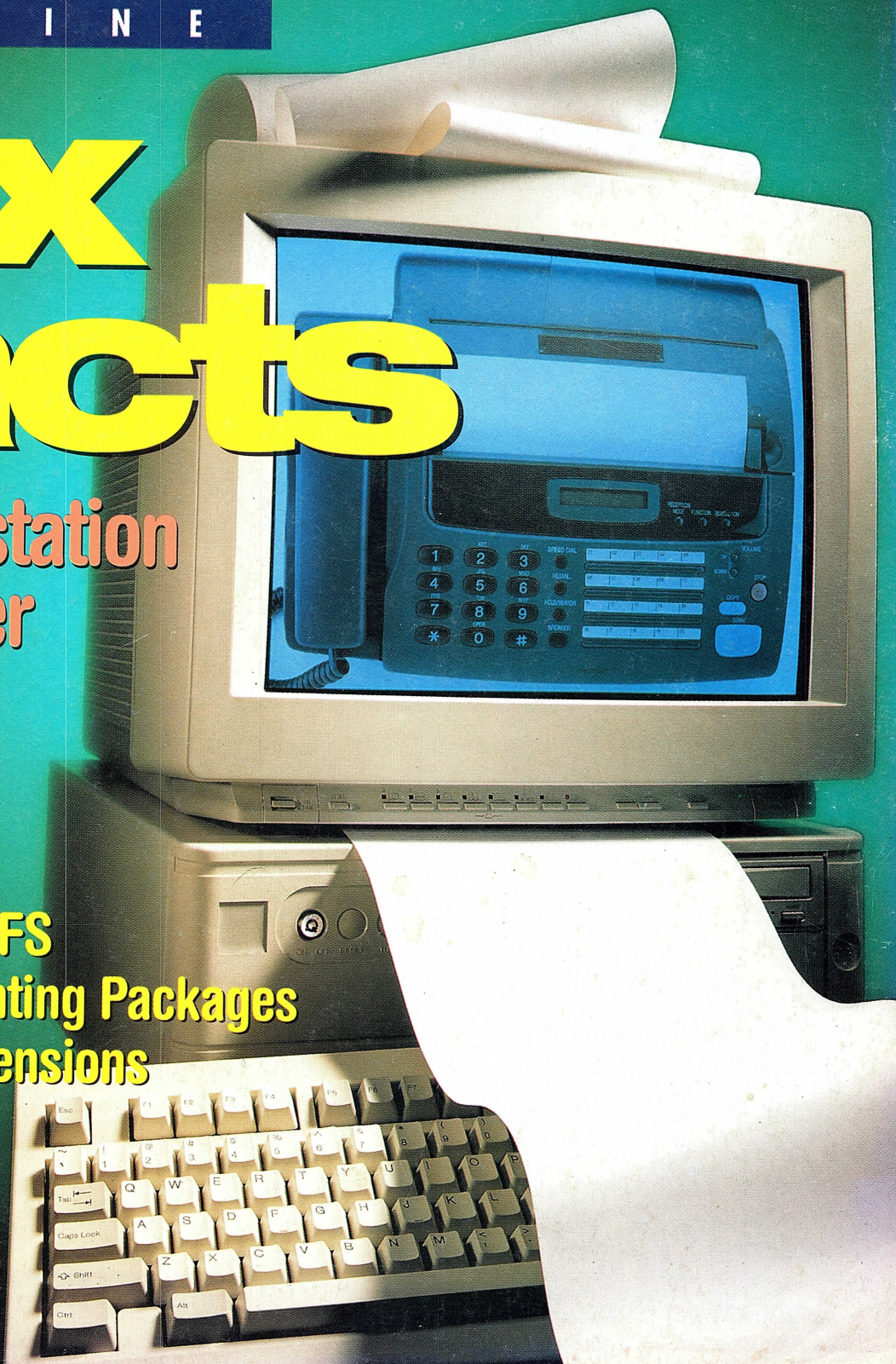
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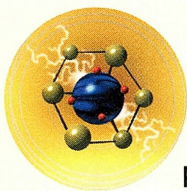
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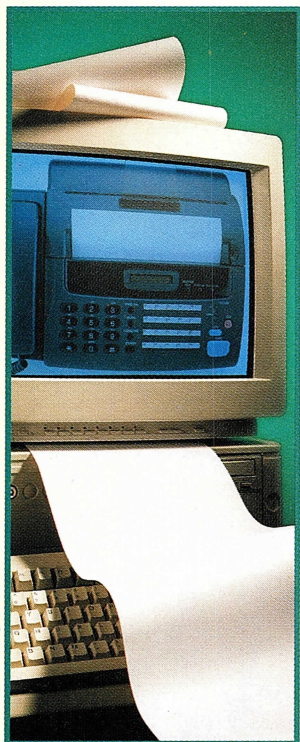
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Table of Contents

Volume Three Number Two February 1996



cover photo by Carter Dow

Features

20 The Facts of Fax

OS/2 Warp is a great faxing platform, as you've probably seen with the included copy of FaxWorks Lite. But there are more extensive fax solutions available, from heavy-duty workstation needs to building a dedicated network fax server. Let's examine the options. By Paul Penrod

26 Everything about HPFS

It's nearly rote: If you're using a large disk partition, format it with the High Performance File System (HPFS), rather than the File Allocation Table (FAT), for best performance. Wouldn't it be nice however to know exactly why HPFS is better? You have questions, we have answers. By Max and Sandy Eidswick

34 Introducing the Developer API Extensions

IBM's Developer API Extensions for OS/2 are new tools which allow native OS/2 applications to be written using many Win32 API calls. Here's a brief introduction to DAX's capabilities for single-source development. By David Reich



42 The REXX Column

Dick Goran provides a whole selection of tips and tricks, thanks to Bernd Schemmer's downloadable tips collection.

46 The World of Objects

Roger Sessions' new column begins by discussing that oft-misunderstood concept, polymorphism, and how it's essential to object-oriented development.

51 GUI Corner

Mark Benge and Matt Smith discuss how raster operations can be exploited when designing and drawing bitmapped icons.

55 OS/2 Toolbox

Guy Scharf talks about Prominare Designer, HockWare's VisPro/REXX, Watcom's VX-REXX, MicroEdge's Visual SlickEdit, and IBM's DevCon 8, and reviews the VX-REXX Object Development Kit.

Reviews

59 Test Drives

Brian Proffitt reviews Sublime Softwares' Xtra Xtra and performs an OS/2 system test of IBM's new PC 350-P90.

62 Personal Accounting Applications

Esther Schindler reviews Computer Interface Corp.'s Check Plus, Paul Caron's Electronic Teller, and Spitfire Software's In Charge.

69 Enhancing the Workplace Shell

Christine White reviews Stardock Systems' Object Desktop, a collection of Workplace Shell enhancements.

Columns

16 Tips & Tricks

David Reich discusses opening windows, initializing DOS, the MOVE command, folder inheritance, printer resets, and more.

75 The Network Connection

Wayne Rash, Jr. describes IBM's new AttachPak, which enhances OS/2 Warp Connect's communications capabilities.

77 Under the Hood

Mark Minasi discusses multitasking and explains how it works in OS/2 Warp.

80 End Notes

Stan Kelly-Bootle reads and reviews Steve Krantz's *Real World Client/Server*.

Departments

7 Perspectives

8 Letters

11 Dateline: OS/2

13 Just Announced

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Alexander Antonides	71154,676
Mark Bengé	73532,2063
Dick Conklin	76711,1005
Dick Goran	71154,2002
Stan Kelly-Bootle	70323,1560
Mark Minasi	71571,264
David Moskowitz	76701,100
Brian Proffitt	75300,1466
David Reich	76711,632
Guy Scharf	76702,557
Esther Schindler	72241,1417
Matt Smith	70363,1175
Alan Zeichick	76703,756

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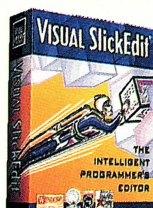
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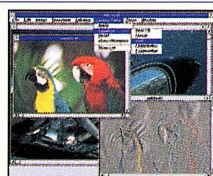
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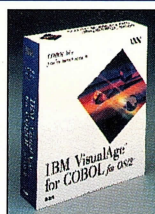


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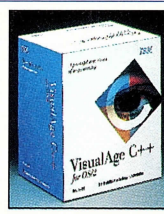
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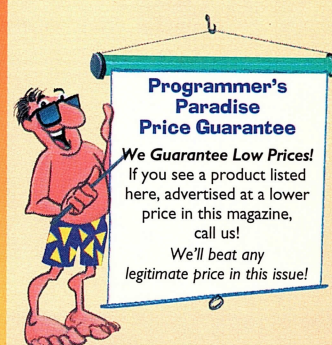
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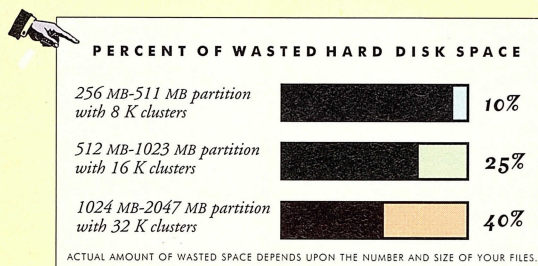
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Perspectives

Straight Answers

Is anyone out there concerned about IBM's long-term commitment to OS/2? Raise your hands... Ah, thought so. You're not alone. Large corporate customers, user-group members, small-business OS/2 users, independent software vendors (ISVs), market analysts, systems administrators, members of the computer trade press, die-hard Team OS/2ers, and even some influential IBM employees and contractors are asking the same questions over and over again. "Will IBM kill OS/2?" "Is OS/2 going to be positioned against Windows 95 and Windows NT, or will it be relegated to a niche role?" "Why is IBM itself not fully behind OS/2?" "Will OS/2 still be marketed as a consumer product through retail channels?"

When IBM's executives answer these and other questions, there's a consistent, but minimal response: "It's clear we're still committed to OS/2, and it's obvious our key customers understand that commitment."

Sorry, IBM. It's not clear. Were it obvious, we wouldn't keep asking you these questions over and over again. You don't hear customers asking Bill Gates, "You're still committed to Windows NT, aren't you?" at every public forum, right?

We've heard messages that IBM intends to evolve and support OS/2 as a connected client for huge Big Blue shops, the proverbial Fortune 100-sized key customers. It's for those key customers that IBM invests in OS/2 products like Team Connection, DB2/2 2.0, and VisualAge COBOL.

But what about IBM's non-key customers? You know, the buyers lured by the "Get Warped" advertising campaign. They're the ones waiting for SmartSuite for OS/2 to match the Windows version. They're the ones still waiting for Bart, the Visual Basic clone, to appear. They're the ones who were annoyed by the StarOffice flip-flop. If OS/2 Warp is a multimedia platform, why are cutting-edge technologies like OpenGL in Intel-based Windows NT and not in OS/2 Warp (Intel Edition)? If OS/2 Warp is our on-ramp to the Information Superhighway, why was IBM so slow to license Java? IBM's messages are incoherent, contradictory, and debilitating.

Let's take a look at some of the messages. **OS/2 Warp in the home office or small office.** IBM executives, from CEO Lou Gerstner down, have said repeatedly that the large corporate market is the company's target, and that the consumer market is "secondary." But what exactly does that mean, Mr. Gerstner? How do products like the Family FunPak and the Just Add Warp campaign fit into your enterprise strategy? How does that sync with your half-hearted promotion of OS/2 as a cool gaming and multimedia platform? Does "secondary" mean that you'll continue to promote and develop OS/2 Warp as a stand-alone client? Or does "sec-

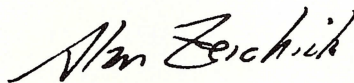
ondary" mean that you secretly wish that nonenterprise OS/2 enthusiasts would just go away?

OS/2 Warp within IBM's software group. Outside of IBM's Personal Software Products division, there's no preference for its home-grown operating system (in which IBM's shareholders invested billions of dollars) instead of a well-known rival. IBM's development and database tools are being ported to Windows NT as fast as the programmers can crank their debuggers. Check out the May/June 1995 issue of *OS/2 Developer*. Turn to page 13: "Oddly enough, the most advanced development tool for Windows 3.1 isn't from Microsoft." It's an ad for IBM's VisualAge 2.0. The OS/2 version isn't mentioned, even in the fine print. Sure, that's a commitment—but to what?

OS/2 Warp within IBM's hardware group. Ditto. OS/2 is still not available across the IBM PC Co.'s full line of products; just look at the IBM PC Direct catalog. At last November's Comdex, some IBMers staffing the PC Co. booth were openly hostile to OS/2, clearly preferring their Windows preloads. For heaven's sake, Mr. Gerstner, do you really think it's good business for your employees to disavow or denigrate their company's products in front of customers and the press? Wouldn't you rather your representatives say, "Sure, we offer Windows 95 too, but why would you want it when you can have OS/2 Warp? Let me show you...."? Instead, it's the other way around. There's a lot of internal "attitude adjustment" that needs to happen, and it needs to happen *yesterday*.

Mr. Gerstner, your customers *don't* clearly understand where IBM stands on OS/2. What's needed is a definitive voice—and not one from Personal Software Products, by the way. Despite a good performance at COMDEX by PSP's new general manager, John W. Thompson can only speak for his division, and he lacks the authority to present IBM's company-wide strategy.

Now's the time for *you*, Mr. Gerstner, to unconditionally endorse *your* products, just as Bill Gates, Scott McNealy, Carol Bartz, Ed McCracken, Larry Ellison, Jim Clark, Bob Frankenberg, and other industry leaders unconditionally endorse *their* products. If you believe in OS/2, we'd like to know. If you don't believe in OS/2, we'd like to know that, too. But please communicate a clear *unambiguous* message that addresses your customers' questions. *All* your customers, not only key Fortune 100 customers, deserve straight answers. Don't you agree?



Alan Zeichick
Editor-in-Chief



Letters

"We are releasing Vispro/Reports 2.0 Beta"

DCF/2 review redux

Dear Editor:

In light of the controversy surrounding *OS/2 Magazine's* recent review of DCF/2 ("Disk Compression Shootout," October 1995, p. 45), I thought you might be interested in my experience with this product.

Last week, having read both the review and Mr. Bergman's refutation ("DCF/2 review refuted," *Letters*, December 1995, p. 10), I decided to try DCF/2 myself. I downloaded the DCF/2 1.4 demo from Hobbes and installed it on my system. I then copied a number of data files to the DCF/2 compressed drive *e:* (I use Dual Boot with DOS and Windows on Drive *c:* and OS/2 Warp on Drive *d:*). Results on my system were as follows: DCF/2 is a resource hog, the likes of which I haven't seen since I deleted Ultimail/2 from my system. Also, the day after I installed DCF/2, I booted my system and attempted to access one of the files I had copied the day before. DCF/2 lost all the files on Drive *e:*. As all of these files were either backed up or scheduled for deletion, I did not attempt the convoluted and time-consuming recovery process outlined in the DCF/2 documentation. Yes, I did perform a proper system shutdown the night before.

To be fair, I've the bare minimum for an OS/2 system: 386SX-25 CPU, 8MB RAM, and 345MB Western Digital IDE drive. Still, my results seem more consistent with your magazine's review than with Development Technology's rebuttal.

Daryl Davis

VisPro/Reports correction

Dear Editor:

Thank you for covering our VisPro/Reports product in your December issue ("Visual Report Writing," December 1995, p. 48). I'd like to provide some additional information and clarify a few points.

Rick Krueer was correct in pointing out that VisPro/Reports 1.0 is targeted at REXX programmers. We also agree with his wish to see end-user database query features added to VisPro/Reports. In fact, just this week, we are releasing VisPro/Reports 2.0 Beta with features that should appeal to programmer and end-user alike. A simple drag-and-drop from our Entity/Relationship Database Designer will allow easy generation of reports with complex joins and business graphics for any ODBC database.

One key feature of VisPro/Reports, not mentioned in the article, is that the VisPro/Reports printing engine is stored in a dynamic link library that programmers can ship royalty-free with their applications. This option allows OS/2 applications, such as the soon-to-be-released TAXDOLLARS from BT&T Consumer Technology, to provide excellent report printing features at a negligible cost.

The phone number you published is actually our fax line. You can contact us at HockWare Inc., (919) 380-0616, fax (919) 380-0757.

Also, the prices published were incorrect. Our retail prices are: VisPro/REXX Bronze (\$59), VisPro/REXX Gold (\$299), and VisPro/Reports (\$199).

Thanks again to Rick for his suggestions. We hope current and new users alike will enjoy VisPro/Reports 2.0.

Dave Hock
President, HockWare Inc.

Some vendors are no help

Dear Editor:

Please note that if you run Intel's utility *rz1000.exe* (Dateline: OS/2, December 1995, p. 11) on a system without an Intel motherboard, the program will tell you to contact the manufacturer rather than continue running. It told me that my Micron P75 has the defective Intel EIDE controller chip and then shut down.

Since the Diamond video cards are prepackaged with so many Pentium

computers, read my suggestions below.

For anyone who attempts to install an OS/2 Warp FixPak (10 in this case) and has a Diamond MM video driver installed, first run the **SYSLEVEL** utility. You will be surprised to learn that your **CSD** has been altered. This is done by the Diamond MM video driver installation program. I have Diamond's latest driver, 2.0, which continues to make this bizarre alteration.

As suggested by Bob Rayburn's article on the Warp Pharmacy Web page (<http://godzilla.eecs.berkeley.edu/os2/pharmacy/warppharmacy.html>), you can **REM** these lines out if you wish. If you do a spell check of the file, you will also notice quite a few misspelled directory names. For example, **INSTAL** rather than **INSTALL**.

However, if the **CSD** level has been altered, you will need to revise it before the **FIXPAK** will install. I had tried to install **FIXPAK 5** earlier, only to be told that there was nothing to fix. Computers don't lie, do they? The easiest way I found to revise the **CSD** level back to the correct OS/2 Warp number was to use Windows Write and carefully type over the offending number.

Things such as this are what give OS/2 Warp a bad name!!!!

Leroy Latta

UltiMail/2 to cc:Mail?

Dear Editor:

In your response to Juan Noyles letter in the November issue of *OS/2 Magazine* (*Letters*, November 1995, p. 9), you stated that "IBM has decided to replace UltiMail/2 Lite with cc:Mail". When and how will this be done? Will it be available through IBM's update gopher? In short, what are the details?

Keith Dombrowski

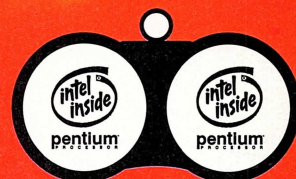
IBM hasn't released any details as to when and how this will take place.

—Alexander Antoniadis

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Andrew Seybold's Outlook

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OS/2 Professional Magazine

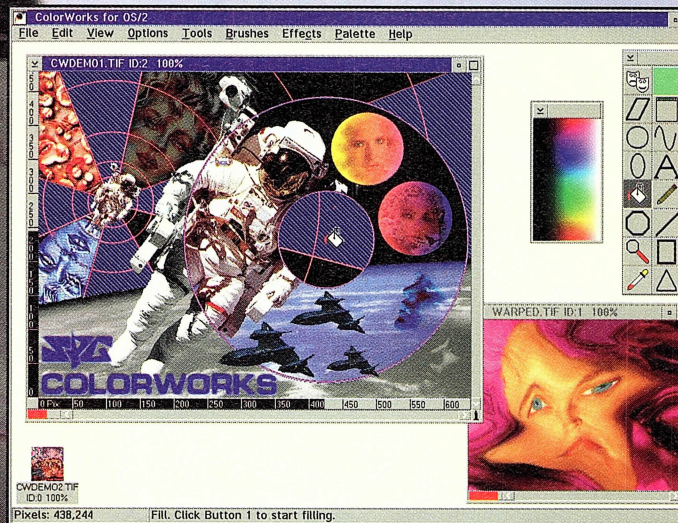
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IBM Lays Out the Next Year

BY ALEXANDER ANTONIADES

OS/2 news from Fall COMDEX

Despite winning a Best of Show Award in 1993, OS/2 has generally had a hard time at Fall COMDEX, the largest computer trade show in the world. The problem stems from the fact that OS/2's presence doesn't extend much outside the massive IBM booth, and in the wake of Windows 95, this year's COMDEX wasn't going to be any different.

To compound matters, the week before the big show, IBM laid off 2,100 workers across its entire software division, including the division responsible for OS/2, Personal Software Products

(PSP). Unfortunately for OS/2, this round of lay offs included Janet Gobielle, Vicci Conway, and Dave Whittle, three of the key people who help organize and support Team OS/2. Team OS/2, the all-volunteer organization that helps spread the OS/2 gospel, is typically out in force at Fall COMDEX, offering to install and support OS/2 in any vendor's machine, much to the chagrin of Microsoft.

Luckily, IBM still helped out this year, as it's done in years past, so Team OS/2 was up to its usual tricks helping Warped wannabes and anyone in search of OS/2 answers. However, the fact that IBM helped Team OS/2 this

time doesn't tell us what IBM will do in the future. Even though many IBM officials verbally reaffirmed their commitment to OS/2 and Team OS/2, to paraphrase an old saying, layoffs speak louder than words.

Another bummer for OS/2 was IBM CEO Lou Gerstner's keynote on November 13, which, despite specifically referencing Notes, had no mention of OS/2. The speech, focusing on IBM's latest hang up—"network-centric computing"—described a world where PCs are little more than glorified 3270 terminals, and everyone rents CPU cycles from (surprise!) mainframes. While the speech itself was entertaining, Gerstner offered little comfort to OS/2 users looking for a renewed commitment from IBM.

More reassuring, however, was the new head of IBM's PSP division, John W. Thompson, who made a strong business case as to why IBM wouldn't walk away from OS/2. The crux of his argument was that in order to drop OS/2 IBM would not only have to completely overhaul its own software development, which is mainly OS/2-based, but would also have to abandon the over 10,000 corporate customers that use OS/2 everyday. While Thompson's speech had more to offer in terms of IBM's immediate direction, it was Lou Gerstner's message that was spread all over the news that week.

One bright spot about OS/2's public perception came from OS/2 software vendor PowerQuest, whose product Partition Magic won Best Product of the Show, signaling to the world that OS/2 is the place where the big companies of tomorrow can get their start.



OS/2 APPLICATIONS TOP 15 LIST—NOVEMBER 1995

This Month's Rank	Last Month's Rank	Product	Company
1	1	Object Desktop 1.0	Stardock Systems
2	2	Partition Magic Personal Edition	PowerQuest
3	3	BackMaster 2.0	MSR Development
4	6	Voyager CD	DeScribe
5	-	UniMaint 4.0	SoftTouch Systems
6	-	Hobbes CDROM Archive	Walnut Creek
7	-	System Commander 2.2	V Communications
8	-	Impos/2 1.2	Compart GmbH
9	4	Family FunPak	IBM
10	9	IBM AntiVirus	IBM
11	-	Bitstream Font Collection	Bitstream
12	10	Borland C++ v2.0	Borland
13	13	BackAgain/2 3.1	Computer Data Strategies
14	11	Performance Plus 3.0	Clear & Simple
15	8	DualStor 3.0	IBM

Since OS/2 Warp and OS/2 Warp Connect are consistently ranked as Indelible Blue's top-selling products, the list shows only the single units sold of the top-selling OS/2 applications. (Best-seller information courtesy of Indelible Blue).

Merlin and Eagle

The biggest announcement that IBM made at COMDEX was about the two new versions of OS/2 due out in 1996. The two code names, Merlin, for the client version of OS/2 (the successor to OS/2 Warp Connect), and Eagle, for a series of enhancements to OS/2 Warp Server (due out in the first quarter), are using a birds of prey naming convention. (Merlin in fact refers to a carnivorous bird, not the wizard in King Arthur's court, for those of you trying to gain some insight into the code name.)

Merlin looks to be just as significant, if not more so, than OS/2 Warp. For starters, project leader Jeff Howard promises that his team will work very closely on what he calls "fit and finish." And judging by the screen shots shown to members of the press during COMDEX, he means it. The look and feel had a definite Windows 95 flavor with close buttons in the upper right-hand corner and settings dialogs with upright tabs, similar to those of the latest SmartSuite. Most of these visual enhancements are made possible by the Developer API Extensions, which map OS/2 APIs to similar Windows 95 calls and will be included in this upcoming release.

Other enhancements include a network-aware interface, which will make needed connections automatically, better multimedia and game capabilities, enhanced plug-and-play features, and an updated BonusPak. Also scheduled for inclusion are the SmartCenter launch pad utility from the Lotus SmartSuite and the Upgrade Advisor utility from the Just Add Warp kit.

OpenDoc should figure heavily in

Merlin's release, but Workplace Shell integration will be linked to how well this first release of OpenDoc performs. The surprising news is that OpenDoc will allow OS/2 documents to contain some embedded OLE 2.0 information.

Two other features of Merlin that will bring OS/2 closer to Windows NT in terms of features and stability are C-2 level security and the integrated fix to the single input queue problem, mentioned in last month's column.

Eagle, the series of add-ons to OS/2 Warp Server, will include a Directory and Security Services add-on, the OS/2 Warp version of SMP, and a special package for making OS/2 Warp Server a better TCP/IP server which will include dynamic IP assigning.

All of these products are scheduled to make their way to market in the second half of 1996, but some components, such as Directory and Security Services, could be out sooner.

OS/2 performance on the Pentium Pro

With Intel's announcement of the successor to the Pentium, the Pentium Pro, IBM made public some benchmarks of OS/2 performance of the latest high-end x86 chip. While the Pentium Pro, which is optimized to run 32-bit code, and OS/2 seem very complementary to each other, some concerns remain about the portions of OS/2 that are still 16-bit and what effects they will have on overall performance. The concerns stem from the 32-bit orientation of the Pentium Pro, which actually runs 16-bit code slower than a comparable Pentium processor. Even though the large parts of OS/2, such as the Presentation Manager and printing subsystems

were rewritten to be 32-bit with the release of OS/2 Warp, some key components, such as kernel, are still 16-bit code. The performance results released were done by IBM's performance testing labs using 150MHz Pentium Pro and 133MHz Pentium PCs. The findings (Table 1) do show a performance gain, but the real test will be how OS/2 on a Pentium Pro compares to OS/2 running on the same speed Pentium.

Just Add Warp

For those who complain that there's no OS/2 offensive against the onslaught of Windows 95, IBM has three words: Just Add Warp. That's the name of the new kit IBM's distributing, both on disk and online to persuade Windows 95 users to switch to OS/2 Warp. This package contains various utilities and information folders to ease in the migration from Windows 95 to OS/2 Warp. These items include a Windows 95 uninstallation utility, information on how to let Windows 95 and OS/2 Warp co-exist, a migration analyzer that helps migration to or from OS/2, and an OS/2 utility to read Windows 95's VFAT long file names. The Just Add Warp kit is available directly from IBM at (800) 426-3333 ext. EA010 in North America, and on the World Wide Web at <http://www.austin.ibm.com/pspinfo/drk95.html>.

IBM MicroKernel goes mainstream

IBM has decided to release the microkernel that will be the basis for future releases of OS/2 as a stand-alone product, helping other developers to leverage the technology. The kernel, which comes with its own development environment, only supports the PowerPC chipset now, but is due to support Intel's x86 chipset, as well as select MIPS, Alpha, Motorola 821, and ARM processors by the end of next year.

The microkernel's near-term usage will likely remain in vertical applications for large companies, such as Northern Telecom, but IBM hopes it will also be used for more general operating systems, such as the University of Miami's Linux port to the PowerPC. For more information about the IBM Microkernel, contact IBM at (800) 816-7493, or (407) 443-6805 outside the United States.

Start building those plug-ins

The Web Explorer Programmer's Toolkit for OS/2, has been released to the public. To download it, simply choose the **Web Explorer Information** item under the **Help** menu in Web Explorer 1.03 and go to the **What's new...** section. Or go straight to the page at <http://www.raleigh.ibm.com/WebExplorer/webhnew.htm>. **OS/2**

Table 1: OS/2 Performance on a 15MHz Pentium Pro vs. a 133Mhz Pentium PC.

ColorWorks (image editor)	121%
DIVE Direct Video Enhancement (game API)	113%
Argonaut Robot (3D demo)	88%
SAS (client/server)	70%
Open GL - DX (3D demo)	53%
Micro Station (CAD program)	49%
Open GL - CDRS (3D demo)	47%
Movie Player (multimedia)	45%
Visual Age (development tool)	30%

Just Announced

New products for the OS/2 community

TaxDollars 1995

For the new tax season

BT&T Consumer Technology announces its OS/2 tax preparation program for the 1995 tax year. TaxDollars 1995 prints regular IRS forms and schedules on plain paper, creates a single print disk for printing forms on other machines, has graphical pie and bar charts, and now includes 1099 and 4562 forms. Also included are state calculation forms for California, Illinois, New York, and North Carolina. TaxDollars 1995 is available for \$17.95.

BT&T Consumer Technology, (800) 672-8293, (714) 363-7185, fax (714) 249-8346, e-mail bttech@electriciti.com, or via the World Wide Web at <http://www.electriciti.com/bttech>.

READER SERVICE NO. 101

The screenshot shows the TaxDollars 1995 software interface. The main window is titled 'TAXDOLLARS 1995: The Best OS/2 Tax Software From BT&T, Inc.' and has a menu bar with 'File', 'Tax Return', 'Select', '1040 Window', 'Refund/Payment', 'Consultation', and 'Help'. Below the menu bar is a status bar that says 'If more than six dependents, see page 14.' The main area is divided into several sections. On the left, there's a sidebar with 'TAXDOLLARS 1995 - Or' and 'TAXDOLLARS 1995 - Print & Utilities'. The central area is titled '6a Yourself.' and contains a form for entering personal information. It includes fields for 'Name (first, initial, last)', 'Check if under age 1', 'If age 1 or older, dependent's social security number', 'Dependent's relationship to you', 'No. of months lived in your home in 1994', and 'No. of boxes checked on 6a and 6b'. There are also checkboxes for 'lived with you' and 'in't live with you e to divorce or separation (see)'. The bottom of the window shows a 'Graphic Print Menu - Working Return: ALTERNATE' and a 'Report Preview - F1040F.vpt' section with a table of income and adjustments.

Corridor

Pipe host data on to the Web

Taubner & Associates has developed a program that can pipe host data to web servers running on either OS/2 or AIX. Corridor can access any AS/400 or IBM mainframe application and pipe the data to the Web as if it was a 5250 or 3270 terminal. Corridor is available for \$6,000.

Teubner & Associates, (800) 321-2638 or (405) 624-2254, or on the Web at <http://www.teubner.com>.

READER SERVICE NO. 102

Witchdesk 1.0

Customize your user interface

Witchdesk is announcing the first release of its new OS/2 interface customization software. Witchdesk has made a custom environment where regions of the OS/2

desktop can be made to react when they are clicked on or passed over with the mouse pointer. Another customization feature can link areas of the desktop with other regions or desktops. Witchdesk retails for \$49.95.

Witchdesk, (408) 279-18885 or fax (408) 271-7289.

READER SERVICE NO. 103

Screen Reader/2 2.0

Bring OS/2 to the visually impaired

IBM is updating an OS/2 program that translates data from computer screens to voice or Braille. This new version of Screen Reader/2 has an improved user interface and customized support for specific applications. The Screen Reader/2 Solution Pack, which includes a special keypad and connecting cable, is available for

\$699 with upgrades costing \$199.

IBM, (800) 426-7630 or on the Web at <http://www.ibm.com>.

READER SERVICE NO. 104

Font Folder 2.0

ATM font manager

Cliff Cullum announces the release of a new version of his OS/2 Adobe Type font manager. New in Font Folder 2.0 is the ability to print out various sizes of the entire character set of a certain font, one-line sample sets of every font in the system, and a listing of all the font files on one system. Font Folder 2.0 is available for \$30 with printing or \$20 without printing. Upgrades are available for \$10.

BMT Micro, (910) 791-7052, fax (910) 350-2937, e-mail orders@bmt.wilmington.net, or via the World Wide Web at <http://www.wilmington.net/bmtmicro/catalog/fffolder.html>.

READER SERVICE NO. 105

Just Announced

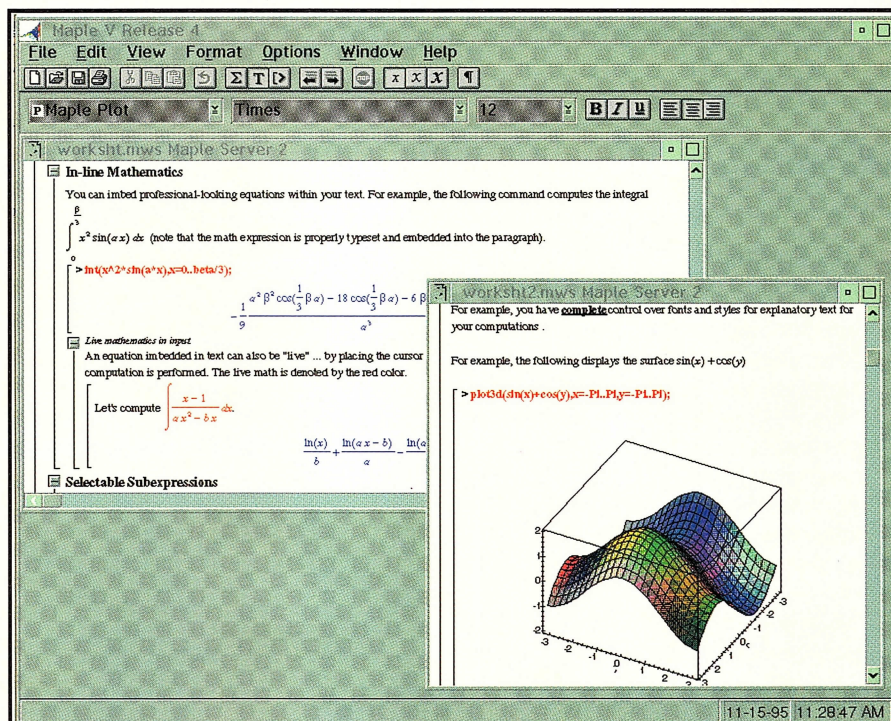
Maple V for OS/2

New calculation software

Waterloo Maple Software is announcing the first OS/2 release of its mathematical computation system. Maple V for OS/2 has a full Workplace Shell interface and is capable of technical document processing as well as computational work. Maple V for OS/2 is priced at \$995 for commercial users and \$695 for academic users.

Waterloo Maple, (519) 747-2373, fax (519) 747-5284, e-mail info@maplesoft.com, or on the World Wide Web at <http://www.maplesoft.com>.

READER SERVICE NO. 106



Screenview

GUI front-end for AS/400 screens

JBA International is releasing a new program that gives AS/400 based character mode programs a graphical

front end. Screenview works on all SAA compliant applications and translates onto both OS/2 and Windows PCs. Screenview is priced at \$199 per PC.

JBA International, (609) 231-9400 or fax (609) 439-9652.

READER SERVICE NO. 107

Unite Storer 1.0

Make your own CD-R jukebox

Cirrus Technology is shipping a new development kit for creating hierarchical storage management products. Unite Storer includes a variety of device drivers for SCSI-based storage devices and a 32-bit API specifically designed to integrate into most OS/2 development environments. Unite Storer is priced at \$2,500.

Cirrus Technologies, (301) 698-1900 or fax (301) 698-1909.

READER SERVICE NO. 108

Just Announced OS/2 Internet Sites

TD Gammon!—A free OS/2 game

This is one of the best backgammon games out there and can also be found in the OS/2 Family Fun-Pak, only online it's free. <http://www.austin.ibm.com/pspinfo/funtgammon.html>

PSP Beta Information

Look here for the latest beta programs in the U.S. <http://www.austin.ibm.com/pspinfo/betahome.html> Those in Europe, Africa, and the Middle East: <http://www.europe.ibm.com/getdoc/psmemea/progserv/beta>

PC Lube and Tune

Excellent information on the OS/2 Warp Internet Connection, including installation, configuration, TCP/IP, and more. <http://pctl.cis.yale.edu/pctl/winworld/os2.htm>

Updated

Gary Hammer's list of essential OS/2 utilities and sites' new address: <http://www.os2.hammer.org/OS2> Also the "Must Have" OS/2 Utilities now has an FTP site available via anonymous FTP at [os2.hammer.org/OS2/](ftp://os2.hammer.org/OS2/)

(Information courtesy of Vicci Conway.)

VisualAge Smalltalk 3.0

Updated development environment

BM is releasing a new version of its OS/2 visual Smalltalk development tool. VisualAge Smalltalk 3.0 now includes support for distributed appli-

Just Announced

cation development, object-oriented reports, better database support (including Oracle and ODBC), and multimedia enhancements. VisualAge Smalltalk is available in a Standard version for \$1,499 and a Professional version for \$3,799.

IBM, (800) 426-3333 or via the Web at <http://www.ibm.com>.

READER SERVICE NO. 109

TE/2 Pro 2.0

New update to venerable comm program

Oberon Software announces the release of a new version of its communications program. TE/2 Pro 2.0 includes a new object-oriented user interface, support for multiple simultaneous sessions, multiwindow chat with scroll-back, and TCP/IP support. TE/2 Pro 2.0 has a retail price of \$129.

Oberon Software, (507) 388-7001, fax (507) 388-7568, or e-mail them at oberon@prairie.lakes.com.

READER SERVICE NO. 110

R:Base 5.5 for OS/2 PM

New GUI for database

Microrim releases the first version of its relational database program that includes a presentation manager interface. R:Base 5.5 also has a new Form Designer Tool Bar, which includes combo boxes, radio buttons, check boxes, formatted borders, and predefined push buttons. R:Base 5.5 retails for \$459 with upgrades priced at \$195.

Microrim, (800) 628-6990 or (206) 649-9500, fax (206) 649-2785, or see its World Wide Web page at <http://www.microrim.com>.

READER SERVICE NO. 111

Source Integrity 7.1B

Presentation Manager Programming aid

Mortice Kern Systems announces the release of its software configuration management (SCM) system. New in this release is a complete Presentation Manager interface with visual merge, improved reporting writing, event triggers, a new configuration language, sandbox environments, and integration into most Integrated Development Environments (IDEs). This program is also available for DOS, Windows, Windows NT, Windows 95, and various flavors of UNIX. Source Integrity 7.1 is priced at \$499, with upgrades available for \$149.

Mortice Kern Systems, (800) 265-2797 or (519) 884-2251, fax (519) 884-8861, e-mail sales@mks.com, or visit its World Wide Web page at <http://www.mks.com>.

READER SERVICE NO. 112

OS/2

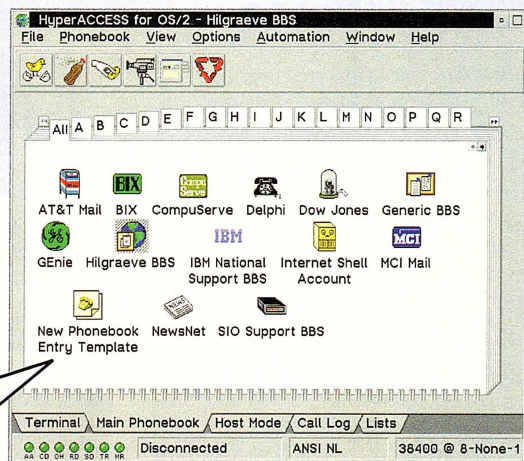
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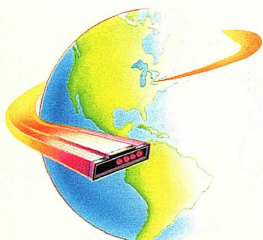
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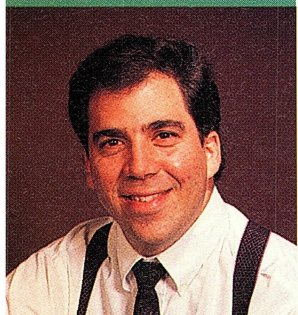
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The Subtle Intricacies

BY DAVID REICH

TIP 208: KEEPING IT OPEN

Q: Is there a way to open a command prompt window, which runs a program, initializes it, and keeps it open so that other programs will run? I want to run the program to initialize the session, but I don't want to type in the initialization program each time I open a window.

A: Sure. As you have found, by specifying a program name in a program reference object—even an OS/2 Window session—the program runs. And when it exits, the session closes. It's possible, however, to have a program run in an OS/2-Windowed command prompt session and keep the session open for other work by making some changes in the Settings notebook.

First, create a program reference object by either using the right mouse button to drag a new instance from the Program template in the **Templates** folder, or by right-clicking on any program reference object (such as the OS/2 Window object in the **Command Prompts** folder), and select **Create Another** from the **Context** menu.

Once you have the object identified, bring up its Settings notebook by right-clicking on the object and choosing **Settings**. Click on the **Program** page; you now have three places to enter data.

For the program path and file name, enter an asterisk to specify that you want the OS/2 command interpreter, *cmd.exe*. Then tab to the **Parameters** field. In this field, enter `"/k"` followed by a space and the path and file name

of the initialization program you wish to run when the session opens. The `"/k"` tells *cmd.exe* to keep the session open after the program that it runs has finished. Tab to the Working Directory field and enter the path you wish to be the current directory for the session. This setting will be the default directory when the program runs and the session is initialized. Now, click on the Session page and select whether you'd like the session to be an OS/2 Window or OS/2 Full Screen session. Double-click on the system icon at the upper left of the settings notebook and you're all set.

TIP 209: INITIALIZING DOS

Q: I use a utility called *trsfont.com* to initialize a DOS session in which I only run Quattro Pro 5. I do know that a DOS setting for a specific *autoexec.bat* file exists for each DOS program. What I don't know is how to write a file that will serve as an *autoexec.bat* file for Quattro Pro and include *trsfont.com*. By the way, the full path name is *c:\clutil\trsfont.com*.

A: *autoexec.bat* is run once when a DOS system is started. OS/2 can use an *autoexec.bat* file when DOS sessions are started to emulate the same behavior. OS/2 allows you to specify a different *autoexec.bat* file for each DOS session, because each is essentially a separate DOS machine.

Setting this up is a straightforward task. First, create a file in the *c:\clutil* directory called *quatt.bat*. You can use the system editor to do this. At an OS/2

command prompt, change to the *\clutil* directory and type:

```
e quatt.bat
```

Now in the editor, type:

```
trsfont
```

and press <Enter>. Now choose **File**, then **Save**, and exit the editor.

Locate the program reference object you use to open Quattro Pro. Open the Settings notebook by using the **Context** menu and left-click on the Session page tab. Click on the **DOS Settings** push-button and again on **OK** to bring up all of the DOS settings. Locate the **DOS_AUTOEXEC** setting in the list and highlight it with a single left-click.

An entry field will be next to the list. In the entry field, tell the session settings where the *autoexec.bat* file for that session is. Type:

```
c:\clutil\quatt.bat
```

into the entry field and click on **Save** to save the new setting and dismiss the dialog. Now double-left-click on the system icon in the upper-left corner of the Settings notebook to close it.

When you start Quattro Pro, *trsfont.com* will run in the DOS session just prior to Quattro Pro.

TIP 210: MOVE REVISITED

Q: With respect to your suggestions using the **Move** command, as explained in "MOVE vs. XCOPY for

Directories" (July 1995, p. 62), I've been using this command to move files between drives for the last two years and have never had a problem. Just select other open folders to move to, or using Drive page, select Other Directory. Why shouldn't it work?

A: The topic you are referencing is more than just a conceptual move operation. You are correct in that you can move files between drives using the MOVE command or the Workplace Shell drives object.

The MOVE command (typing MOVE with a set of arguments at a command prompt) is restricted in that it will not move files between physical drives. If you have several places on a single physical drive, MOVE can do this without a problem.

The Drives object only allows you to move files between partitions on the same drive or across physical devices. This is a benefit of using the graphical shell versus the command line interface.

TIP 211:

FOLDER INHERITANCE

Q: How can I change the default for, a Workplace Shell object type? For example, I like all my folders to have the Always Maintain Sorted Order property. However, when new folders are created, they don't have that property because the default is set to not sort. I tried changing the Folder template object, but it didn't work.

Also, is there a way to change the same setting for multiple objects? It would be nice if you could highlight 10 folders and simultaneously change all of them to Always Maintain Sorted Order.

A: You are on the right track in setting newly created folders to have customized attributes. In your example, to have newly created folders possess a particular attribute such as Always Maintaining Sorted Order, you only need to change the attribute on the

template in the Templates folder. Subsequently, all newly created instances of that object type (or class), from that template, will have that property. To set up the folder object class, open the Templates folder and right-click to bring up the Context menu for the Folder template. Select Settings with a left-click.

Next, click on the Sort page and check the box for Always Maintain Sorted Order. Close it with a double-left-click on the system icon on the Settings notebook. From now on, all folders created by using the right button to drag off that template will possess the Always Maintain Sorted Order attribute. Folders created through other methods will not have this attribute.

Unfortunately, no way exists to grab several instances of an object (such as folders) and set the settings for them all at once. You either need to set each one individually, or after setting up the template, create all new ones, drag your objects to these new folders, and delete the old ones.

TIP 212:

PRINTER RESET

Q: I have installed a DOS booklet printing program that prints on both sides of the page. When I run the program, the first side prints fine in landscape 2-up style. But when I go to print the second side, the output is back to portrait style with the default settings. The software vendor said that OS/2 is sending a reset to the printer. How do I get OS/2 to stop sending this reset?

A: Ahhh, you've hit on one of the big issues with some DOS applications and printing on OS/2. Because the DOS application is sending the document as two separate print streams (open, send it to the printer, then close and repeat), the printing subsystem and spooler see this as two distinct print jobs and send a reset between them. Since the DOS application knows it sent the printer sequence for a 2-up mode at the start, it doesn't think it has to send it for the second data stream (it doesn't know that OS/2 sent a reset between streams.)

If you combine the two print jobs

into one print file from the application, the reset won't be sent until the job is done. Do this by telling the application to print to a file, and the instruction to set the printer to the 2-up mode will be at the start. Then, send this one file to the printer as one job.

Another thing you could try (depending on your printer) is appending a printer control sequence to the first job that tells the printer to ignore the next *x* bytes, where *x* is the number of bytes for a printer reset. The second job will get in the queue without the printer being reset. Another related idea is to set up a separator page for the printer. The separator page has control codes that tell the printer to ignore the next *x* bytes, where *x* is the number of bytes for a printer reset. This technique is not for the faint of heart, because you will need a great deal of intimate printer data stream knowledge.

TIP 213:

DYNAMIC PATH UPDATE

Q: I have been trying to add a string to the path statement in O/S2 2.1. I have updated the *startup.cmd* file as follows:

```
REM -- THE FOLLOWING LINES
REM WERE ADDED HERE FOR THE
REM PC3820 PROGRAM.
PATH=C:\LP3820;%PATH%
DPATH=C:\LP3820;%DPATH%
START "PC3820" /C
C:\LP3820\PC3820.CMD
mode com1:96,n,8,1,to=on
spool /d:lpt1 /o:com1
EXIT
```

These statements were placed in this file by a C program on disks. Because I am trying to load the software for local printing at several remote sites, it's necessary to have something that is installable by anyone. The problem is that the update to the PATH and DPATH statements doesn't work. Even SET PATH doesn't work. How can I update *config.sys* dynamically, without hard-coding the changes I want directly into *config.sys*? Nobody seems

to be able to answer this question. I would think that this should work.

A: You're falling into a very common trap. You update the path for the current session but then use **START** to start PC3820, which starts another session. This new session does not inherit the changes you made to the other one with *startup.cmd*.

Instead of calling PC3820 with **START**, you can use **START** to call a **CMD** file that sets the path and invokes PC3820 directly. So, to use your example, in *startup.cmd*, simply put in a line such as:

```
mypc3820
```

and then make sure there is a path to *mypc3820.cmd*. In this file, put:

```
PATH=C:\LP3820;%PATH%
DPATH=C:\LP3820;%DPATH%
mode com1:96,n,8,1,to=on
spool /d:lpt1 /o:com1
PC3820 /c.
C:\LP3820\PC3820.CMD
```

Note that I am assuming how you are running things. The solution to your problem is that you are using **START** to start a session that runs your **CMD** file to make changes to the path and then invoking PC3820. In your example, you are making changes to the path in a session but then starting the program in a new session, which doesn't inherit the path changes you made in the first one.

TIP 214:

WINDOWS PRINT DRIVER

Q: As explained in "Windows Multitasking" (August 1995, p.70), you answered a question for a user who was trying to multitask while printing and using WordPerfect in Windows/2. Would the question asked have a different answer if the reader was using Windows print drivers instead of the native WP drivers?

A: In the referenced question, the user was wondering why he wasn't

able to make more changes to the WordPerfect document while it was spooling. In short, DOS and Windows 3.1 programs don't know about multithreading, so doing more than one thing at a time isn't possible for them, as with OS/2 programs. This fact is why the user was unable to work further on the document until it had finished being spooled to the printer.

It wouldn't be any different if the user was using the printer drivers that came with OS/2 as opposed to the ones that came with WordPerfect. The bottom line is that OS/2 will allow a program to do other things while the printer drivers are off processing and printing something already spooled (the function of a spooler). For DOS or Windows 3.1 programs, however, which don't have a separate print spooling thread, the user must wait until the spooling is complete to do anything with the application. OS/2 programs, with multiple threads for printing, allow the user to continue in the application while the spooling is taking place.

It is worth noting that it doesn't make a great deal of sense to change a document while it's spooling because you want to print the document and then change it after printing it. Changing it while it is printing is akin to changing originals in the copier before the first original's scan is complete.

TIP 215:

MORE ON DEFRAG

Q: After reading your defragging tip in "Defragging" (August 1995, p. 69), I had some questions regarding using XCOPY, formatting the disk, and XCOPYing back.

If the original is a FAT-formatted drive, can I change to HPFS-format and then restore using XCOPY?

To make the first pass with XCOPY, is the correct command `xcopy e:\ d:\backup /s /h /t where e:\=source and d:\backup=target?`

Is this done through OS/2 or DOS (reading DOS 6.22 XCOPY help, it states that XCOPY doesn't copy hidden and read-only files)? If booted under OS/2, some files don't copy

because they are in use. How do you get around this? I have to assume you need to use utility boot disks to restore the XCOPYed files back to the new formatted partition?

A: Because XCOPY is simply a bulk copy, as opposed to a compressed backup or bit for bit backup, it is file-system independent. It's similar to executing **copy** commands over and over and over. As such, you can XCOPY from any file system to any file system, as long as enough room on the target drive exists.

The command syntax you want to use is correct, but I recommend using the `/h /o /t /s /e /r /v` switches to ensure getting all files, regardless of mode, and verify the copy as you go, including all subdirectories.

While OS/2 does maintain a level of compatibility with DOS commands, many of the OS/2 commands are enhanced and support more than DOS. You should generally look at the OS/2 Command Reference to get the exact syntax of the OS/2 commands. The equivalent commands for DOS in an OS/2 DOS session (VDM) correspond to the DOS functionality for that command.

If you are copying files back to your boot partition, then use either the utility disks or boot from the install disks and <Esc> to get to an OS/2 command prompt. This will ensure that the files you want to overwrite are not locked or open.

The process is simpler than manually copying each file. Issue one command in this case instead of several. It's just a bulk file copier. XCOPY is similar to doing `copy *.*`, as well as including other options in order to traverse directories to verify and selectively include or exclude files with certain attributes.

OS/2

David Reich has been with the OS/2 development team since 1987. David is a contributing editor and has written numerous articles on OS/2. He is the author of "Designing High-Performance OS/2 Warp Applications," published by John Wiley and Sons. Questions can be addressed to David via CompuServe at 76711,632 and via the Internet at speedracer@vnet.ibm.com.

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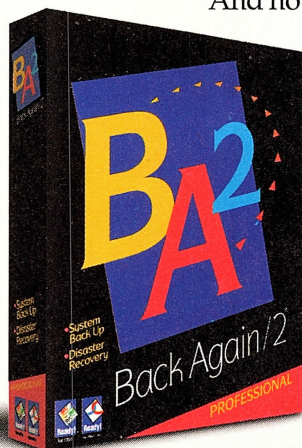


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System requirements: IBM OS/2 2.1 or greater, and support for most SCSI tape drives

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The Facts of Fax

By Paul Penrod

Difficult problems often lead to ingenious solutions. One common problem: getting documents across town—or across the world—faster and more reliably than a courier and with more detail than a telegram. The solution: the fax machine.

Although faxing has been around for decades, the rapidity with which the facsimile was adopted and spread from business to business in the 1980s is a testament to how closely it solved a difficult problem.

Clever people invented the fax. Other clever people figured out how to put faxing to use in a computing environment. Nearly every major operating system contains fax software today, and OS/2 is no exception. But with its emphasis on e-mail and the Internet, faxing is one of OS/2's best kept secrets.

Of course, included with the OS/2 Warp BonusPak is Global Village's FaxWorks Lite. This full-featured fax program can handle many individual and small-business needs. But what if your business has special needs that go beyond sending and receiving the occasional faxed document? That's the environment for OS/2 fax applications, addressing network and business needs often right out of the box. Other packages allow for customization or provide programming tools to develop faxing applications to address unique situations.

Our survey of OS/2 fax solutions encompasses three distinct categories: stand-alone, LAN support, and programming support.

Stand-alone fax software

Stand-alone fax software appeals to those who run a very small business, or use OS/2 at home or at school. The reason for this is simple: Many of these OS/2 users have stand-alone systems and do not require the additional LAN support and associated software complexity and cost that it entails. Rather, this kind of software contains other features that are of interest to heavy or sophisticated fax users.

FaxWorks Pro

Global Village's FaxWorks products are retail versions of the same software licensed to other vendors by the Keller Group Inc. In addition to Global Village (who happens to be the Keller Group's largest publisher), IBM Asia Pacific, Open Port Technology, Malibu Software, and Commetrex are among the licensees of the fax engines and front-end applications for inclusion into their existing products.

If you're used to FaxWorks Lite, then FaxWorks Pro should be an easy transition. Built from the same code base as FaxWorks Lite, it looks virtually the same, but some noteworthy additions are available, such as an enhanced printer driver, OCR, and graphics manipulation.

The FaxWorks Pro printer driver is the same enhanced driver that Commetrex sells as part of its product line (both drivers originating with the Keller Group). In short, FaxWorks Pro's printer driver can support Hewlett-Packard's PCL-5 printer language and emulation, plus act as a logical printer under OS/2 to convert an application-generated document to a fax.

One new feature that makes FaxWorks more flexible is the optical character recognition (OCR) support. Utilizing the Calera OCR engine, FaxWorks allows faxed documents to be scanned and the text converted to a readable format for applications such as word processors. Many businesses find this feature convenient, as it facilitates using the information as part of a word-processing document or e-mail, or converts the fax into text that can be stored more efficiently for archiving purposes.

If faxes need to be manipulated after being received, FaxWorks Pro can annotate them by moving things around or adding comments, information, or graphics to the document before faxing it back to the sender or on to a new destination. Allowing users to edit faxes is a powerful tool, as it gives them more control over their work and more efficient use of time and resources.

PowerFax

Commetrex Corp. offers a line of faxing products based on the Natural Microsystems's VBX-series Digital Signal Processor (DSP) voice boards. These boards, when configured with the MultiFax interface layer, can act as a voice proces-

sor and a fax modem with fax-on-demand features—all without having to add additional fax hardware. With four VBX 12-port boards, a single OS/2 machine can support two complete T-1 (48 phone line) connections that automatically switch from voice to fax, to modem, and back again.

PowerFax is a native OS/2 PM application that allows the user to manage faxes and interface with the MultiFax/Natural Microsystems VBX platform. The base code is adapted from the original front-end offering by the Keller Group (FaxWorks) and integrated into the VBX environment to take advantage of the special features and functions offered through the MultiFax interface. Included with PowerFax is a print driver that allows other applications to print to PowerFax as if it were a printer. This driver converts the output to MultiFax-compatible fax files that can be queued for sending.

If you need lots of lines, PowerFax can be made available in configurations supporting as many as 60 lines off a dedicated server.

PowerFax Enhanced Printer Driver

This printer driver, also from Commetrex, does more than the standard driver supplied with the PowerFax and PowerFax LAN Server products. The driver facilitates the automated printing of a document that may require conversion and spooling to the fax printer driver. For example, a text document, such as an e-mail message, could be converted to a fax document with a cover page generated and then spooled to PowerFax to be sent.

To accomplish this level of automation, the Enhanced Printer Driver includes a superset of Commetrex's Fax Description Language, which is designed to handle the conversion of documents, page descriptions, graphics, cover sheets, forms, and the automatic faxing of documents.

LAN supported faxing

Faxing is quickly becoming a natural extension of network functionality, especially in the workgroup environment. Comparatively speaking, fax/modems are not that expensive when compared with hardware such as telephone switches, PBXes, routers, bridges, and hubs. However, it's not cost effec-

tive to place a fax modem on every desktop, pay for a phone line, and maintain it all, especially when a network pathway is capable of funneling all faxing requests to a single point for distribution.

According to figures published by Commetrex Corp., fax communications account for 10 to 15% of a firm's telecom budget, rising to as much as 25% for businesses that employ fax communications as a primary means of conducting business. Hence, fax software, which uses the network to send requests to a single network fax modem and distributes received faxes to the intended recipient pays for itself over time due to reduced costs of maintenance and increased efficiency at the desktop.

It is rare these days to find networks of any kind at home or in the dorm room. Fax software that supports networking usually occurs in businesses and institutions that need to have people share data via a network.

Because most networks operate the same in terms of general functionality, the features that network-based software provide tend to be somewhat homogenous from package to package. The differences between software packages relate to the scale and type of business problems they are intended to solve.

For example, using a fax application that generates matrix phone lists, sophisticated links between UNIX, MVS, AS/400, and the Internet, plus routing to hundreds of thousands of people is a waste of time and resources—especially if the size and scope of the business problem only requires that the software track and handle requests from a few dozen people on an isolated Novell network.

As each of these fax packages have many similar abilities and features; each tends toward a different type of business problem. With that in mind, it's important to think about what your business fax needs are and how you anticipate trying to solve them before ever diving into a package of this nature.

PowerFax LAN Server

Commetrex's PowerFax LAN Server is a superset of the PowerFax stand-alone product and covers workgroup and LAN support in a Novell NetWare or IBM LAN Server environment, in addition to regular faxing chores. Therefore, PowerFax will work well within the depart-

mental LAN or small- to medium-sized business environment.

PowerFax aims at consolidating fax support on the network to a central point, but with a large degree of flexibility. No dedicated server is ever required to create a fax server, meaning that any workstation on the LAN can function as the fax server, without having to be a dedicated LAN server.

In addition to flexible placement of the fax server within the network, PowerFax does not contribute obtrusively to network traffic once it is operating. This is due to PowerFax's non-polling nature, which keeps it from pestering the communications hardware to see if anything is happening.

PowerFax allows for two basic network configurations: Shared Mode and Private Mode. Shared Mode creates a central data directory where all received faxes land, giving everyone access to all faxes received on that network. In exchange for the simplicity of creation and maintenance, user privacy and routing of faxes goes out the window. Private Mode, as the name implies, does just that: it provides a measure of privacy to fax communications between individuals. More importantly, it accomplishes much of this by automatically routing received faxes to specific addresses on the LAN. Once the fax gets to the right user, it lands in a private fax mailbox under the direct control of the user.

FaxWorks Pro LAN

Global Village's LAN version of FaxWorks Pro provides a stable interface that users of the FaxWorks and FaxWorks Lite products will have no trouble maneuvering through. This product will find a good home in an OS/2 Warp Connect environment or on a NetWare LAN, either one sporting DOS and Windows client machines in addition to OS/2. As such, FaxWorks Pro LAN for OS/2 will work well within the departmental LAN and the small- to medium-sized business environment, especially when there is a mix of DOS, Windows, and OS/2 workstations.

FaxWorks Pro LAN shares the same code base as PowerFax LAN, since they are both licensed from the Keller Group. Because of this, the features for both programs are similar. The main difference is that PowerFax LAN is specifically set up around Natural Microsystems's

hardware and uses the MultiFax interface, while FaxWorks Pro LAN supports standard fax modems from companies like Intel, US Robotics, and Supra.

RightFax

RightFax Inc. recently introduced RightFax 4.0, which expands on the Novell networking base from version 3.5 and has also become a true multitasking application in the process. This product's focus is to provide seamless integrated fax services across a LAN from the desktop. By doing so, RightFax takes advantage of LAN and system scalability to provide appropriate fax services for companies from small size to Fortune 1000 size.

RightFax 4.0 supports many desktop client platforms, such as UNIX, DOS, OS/2, Windows 3.x, Windows NT, and Macintosh. Network support includes NetWare, LAN Server, and Windows NT Server, thereby allowing for multiple environment integration for a single solution to faxing needs.

RightFax currently supports up to 24 lines (T-1) maximum per fax server in the U.S. and up to 32 lines (E-1) maximum in Europe, which is less on a per-server basis compared to PowerFax's 60 lines and FaxWorks' Pro LAN's 96 lines per fax server. However, RightFax compensates for this by dynamically firing up additional servers to bring on more lines on an as-needed basis to handle peak load conditions.

Similar to PowerFax and FaxWorks Pro LAN, RightFax provides such advanced fax features as, combining multiple documents, including signatures on documents, and manipulating annotations and graphics.

One unique feature of RightFax is Unified Platform Integration, where each system can access a single administration client, a single utilities client, and a single database of faxes, users, and phone books. This capability bypasses the need to worry about which kind of workstation the user is running to make use of RightFax and administer its operation.

RightFax also offers an optional e-mail gateway, supporting Lotus Notes, Novell GroupWise, and Microsoft Mail. A wide variety of word-processing and common graphics file formats are provided as well; with this support RightFax can respond directly to the user via the mail system as well as integrate with

existing e-mail systems, thus bypassing the need for a Message Handling System (MHS) layer.

RightFax can be integrated with IBEX Technology's FactsLine for a synchronized voice response system. This feature can be helpful in establishing automated information delivery systems, such as help lines, product information, and sales functions. Plus, RightFax can scan the first page of a document for key words in order to route the document to the correct person or place. This can also be combined with e-mail to scan and send the document to the right person automatically.

FaxGate/2

Teubner & Associates's FaxGate/2 is one of the most connection-minded products for faxing to come along for OS/2. FaxGate/2 aims to automate the generation and delivery of paperwork by using the fax as an integral part of the network. The original product, FaxGate, was developed for large-scale SNA mainframes to handle high-volume traffic. Today, FaxGate talks to more than just SNA mainframes. Teubner has provided software to talk to CICS systems, AS/400s, and across TCP/IP networks, plus it has created a native OS/2 fax server product called FaxGate/2.

FaxGate/2 can best be of service when the requirements stipulate document automation in volume and large-scale networks with multiple document formats. Usually such environments are found in large companies, financial and academic institutions, and governmental agencies. FaxGate isn't limited, however, from supporting small- to medium-scale network systems that traffic in large volumes of faxes. Like RightFax, FaxGate/2 can use a number of document and graphics file formats.

While FaxGate/2 supports bi-directional T-1 telephony, it also comes with additional features that give it the edge when scaling to large systems. One feature is simultaneous support for multiple hosts. Information can come from one or many sources at the same time, and not necessarily from the same type of system that the server is currently running. The ability to handle the routing of these documents and the conversion of each document into something usable under FaxGate is paramount; otherwise documents can become corrupted or worse yet, lost entirely.

FaxGate/2 offers support for both inbound and outbound SMTP e-mail, with its ability to seamlessly take SMTP Mail and create a fax from it or vice versa. It only makes sense that documents should change format transparently, if only to accommodate the limitations of the application software being used to communicate between users.

FaxWare

Tobit Software International is a new player in the U.S. market for fax software. The parent company, Tobit Software Gesellschaft (Hamburg, Germany), is known in Europe for its communication software for NetWare and for enterprise-wide communications.

Its new product in the U.S. market is FaxWare 3.0, a 32-bit NetWare Loadable Module (NLM), which recently received compatibility certification from Novell Labs. This product focuses on providing tightly integrated fax services in a NetWare environment.

FaxWare 3.0 delivers support for as many as 64 fax lines at Group III 14.4, while simultaneously supporting up to 1,000 users and 32 servers per LAN. FaxWare delivers this support via three layers: the service layer, the transport layer driver, and the front-end layer.

The service layer is the NLM itself and resides on the server of choice. The transport layer driver provides the network administrator the ability to configure and use the hardware that best supports network configuration. FaxWare's support for hardware includes Class 2 fax modems, ISDN, and serial-port fax machines, and it works with Novell NetWare Connect and NetWare Connect for ISDN. The FaxWare 3.0 front-end layer provides the user interface, allowing it to send and receive faxes via the network. FaxWare supports OS/2, DOS, Windows, Macintosh, and UNIX.

In addition to the front-end layer, Tobit's FaxWare provides server-oriented, group-specific phone books and support for NetWare services, such as bindery services, queue services, IPX communications, AIO, and multithreading.

Programming support

When off-the-shelf solutions won't cut it, these next products step up to the plate to help address a company's rare or unconventional faxing requirements.

Custom creation of fax solutions might seem unusual, but large and small companies have found workable, timely, and cost-effective solutions by bringing problem solving in-house.

A key to success is understanding exactly what your business's fax problem is, beyond the basic, "We need something that works." Investigate thoroughly the needs and requirements you have, then go look at the products, including the ones listed here.

PowerFax Developer's Toolkit

Commetrex's PowerFax Developer's Toolkit integrates the development of custom faxing solutions with hardware by providing a generic layer to the fax modem, data modem, and voice-processing hardware, located within the PC being addressed. Rapid fax application development is the goal, without having to expose applications' programmers to the vagaries of the Natural Microsystems APIs.

The Developer's Toolkit allows programmers to integrate PowerFax functionality, via named pipes, into in-house applications. Features available through the PowerFax API include sending and receiving faxes, fax format conversion, API function swapping, phone book, dialing, receiving notification, routing, and running reports.

Because of the client/server nature of PowerFax's APIs and library, development of concurrent usage applications is relatively straightforward. In fact, the API facilitates development of in-house single-point control programs that can manage multiple fax servers from a single computer.

MultiFax for VBX

Designed to be the virtual interface layer between the VBX board and the fax application, MultiFax provides a Fax Description Language (FDL) that simplifies fax application development. Instead of dealing with hardware issues, an applications developer develops code that deals with tasks, such as generating faxes on the fly from a series of graphics and text elements.

Since it is the MultiFax software itself that determines features and behavior of the VBX boards, software updates can be received from Commetrex's BBS. Commetrex will, over the phone, upgrade the number of concurrent ports available to your application

by issuing a change in password security keys.

Far Voice System

Far Systems's Far Voice System is a native OS/2 application that accommodates all forms of voice processing and computer telephony. Of key interest here is the automated fax service that is provided as part of the company's integrated system. The automated fax module of the Far Voice System has two specific areas of focus, fax-on-demand and fax broadcast.

Fax-on-demand means just that: a customer can order a fax to be delivered by dialing into the system via telephone and requesting a document. Unlike simple fax-on-demand services, the Far Voice System lets a caller order a document to be sent from the same phone from which the phone call came. This works for customers who call from a fax machine, ready to receive a document. Alternatively, the caller can send a fax document to a different number, provided by the caller or selected from a database of stored numbers.

Far Systems also makes provisions in its fax-on-demand module for the high-capacity needs of organizations, such as service bureaus or multidivisional companies. In these situations, fax-on-demand can support capacities approaching 10,000 separate systems, with up to 10,000 documents per system.

Fax broadcasting is a convenient means to send a document to many places at one time. The Far Voice System automatically broadcasts a fax at a pre-selected time from a selected list of phone numbers. The FAR Voice Systems can support up to 10,000 lists with up to 100,000 names per list.

Regardless of the fax sending or retrieval method, the Far Voice System stores fax documents electronically for processing. Originally, they could have been a word-processing document, a received fax, or a scanned original.

Fax support runs to a maximum of 24 lines per system, with 48 voice lines for interactive voice response and multiple RS-232 connections when using Dialogic hardware. There is also support for terminal emulation, links to e-mail, and voice mail.

Because Far Systems has aimed its product at businesses that need specialized solutions, one of its strengths is the system's ability to adapt to diverse re-

quirements and the company's willingness to work with clients and vendors in

developing custom voice, data, and faxing solutions.

Resources:

FaxGate/2

Tuebner and Associates Inc.
(405) 624-2254
Fax (405) 747-8421
READER SERVICE NO. 113

RightFax 4.0 for OS/2

RightFax
(520) 327-1357
Fax (520) 321-7456
READER SERVICE NO. 114

PowerFax

Commetrex
(404) 564-5522
Fax (404) 564-5649
READER SERVICE NO. 115

Far Voice

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FaxWare 3.0

Tobit Software International
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Fax (408) 982-2517
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Everything you always wanted to know about HPFS...

...but were afraid to ask. By Max and Sandy Eidswick

You've probably seen many articles about the High Performance File System (HPFS) and plenty of coverage in OS/2-related books. So why yet another one? Because, more often than not, the articles written about HPFS delve so deeply into the file system's data structures, Fnodes, and bitmaps, that HPFS's basic benefits are overlooked—a case of not being able to see the forest for the trees.

Let's look at the forest by discussing a few of the most common questions about HPFS.

Where did HPFS originate?

Back in 1985, IBM and Microsoft agreed to jointly define and ship Operating System 2, the next generation of DOS. OS/2 development continued during the mid-to-late 1980s as a cooperative effort involving design engineers, developers, and programmers from both companies.

Part of this cooperative development was the design of a new, advanced file system. Network servers needed a file system better suited to efficiently managing huge amounts of data on large disks than DOS's File Allocation Table (FAT) system. They needed a file system that was both reliable and capable of supporting the multitasking server environment.

HPFS provided the solution. It was designed by Gordon Letwin of Microsoft's network division as an advanced file system for Microsoft's LAN Server product. (This original version of HPFS is what we know today as HPFS386.)

When OS/2 1.2 shipped, it included its own desktop version of HPFS, providing the desktop with a file system that could manage large volumes of disk space more efficiently than the FAT system and robust enough to support OS/2's multitasking ability on the standalone PC.

The original HPFS386 was written in assembler language. The newer HPFS, shipped with all versions of OS/2 since 1.2, is written instead in C, most likely because C was more comfortable for those maintaining code than was assembler language.

How does HPFS differ from FAT?

The key difference between HPFS and FAT is the way each goes about storing data on a disk. To understand the difference, let's first explore how storage space is allocated on a disk formatted under FAT.

FAT

FAT is short for *file allocation table*. The file allocation table is just that: a table containing entries that point to the physical location on the disk of the cluster or clusters in which all or part of a file is stored. A cluster is a grouping of 512-byte disk sectors (typically the smallest element of disk storage addressed by PC-based device drivers). Files are simply chains (or linked lists) of clusters in the file allocation table. The clusters containing the sectors of any given file are, more often than not, scattered over the disk.

What is most important to understand about the file allocation table is that its size is limited to no more than 64K entries. Therefore, as disks have gotten larger, the size of the minimum cluster has had to increase, too, in order to keep the number of table entries below the 64K threshold. Table 1 shows the relationship between the size of a disk or volume and the minimum cluster size permissible using the file allocation table.

Every file on your disk consists of at least one cluster. As the size of a file exceeds one cluster, a new cluster is allocated and added to the end of the chain. For each file, an average of half the last cluster will be unused. This unused space is known as slack or lost space, and as your disk size grows, the proportion of it that is consumed by slack space grows dramatically, because of the ever-increasing size of the minimum cluster.

To examine the relationship between disk or volume size

Table 1: File allocation table relationship between disk or volume size and minimum cluster size.

Disk or Volume Size	Minimum Cluster Size
32 MB	½ KB (512 bytes)
64 MB	1 KB
128 MB	2 KB
256 MB	4 KB
512 MB	8 KB
1 GB	16 KB
2 GB	32 KB
4 GB	64 KB

Lock and Load!

CENTRALLY MANAGING, SECURING, AND DELIVERING AN OS/2 DESKTOP OVER ANY LAN BY ERIC OSMANN

OS/2 has become a corporate workhorse since its inception several years ago. Yet many questions have arisen on how to manage the workplace shell and, most important, secure it and the applications it helps launch.

There are a few tools which advocate their ability to manage the shell - most work best in a stand-alone mode. Still, the corporate environment demands efficient centralized management and security optimized for networks. This requirement, combined with my background in development of the OS/2 workplace shell, has led to a careful examination of OS/2 security and commitment to The Desktop Observatory by Pinnacle Technology. This paper discusses the requirements and the features built into Pinnacle's unique technology.

Requirements

Although pure file level security requires IBM's Security Enabling Services (Pinnacle has been a member of Beta efforts and is architected to support these key features already available for 2.11), there are critical elements in OS/2 security that go well beyond the simple ability to restrict right mouse button options. These include: 1) ease of creating desktops; 2) network design; 3) additional security elements; and 4) flexibility.

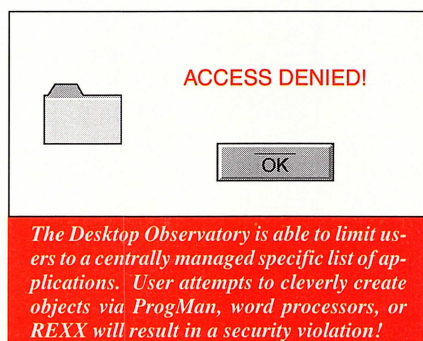
Ease

Pinnacle has developed a powerful SOM based tool called "Finder". Finder allows an administrator to quickly create a desktop, snap a picture of it (including all of those oblique DOS settings) and save it to Pinnacle's bandwidth-sensitive file (patent pending). Files can, of course, be saved anywhere on the network and instantly be built at any machine. There is no need for an administrator to know REXX, although those who do will appreciate Pinnacle's ability to associate

"events" (programs, etc.) with objects and the pure speed at which it builds desktops.

Network Design

The Desktop Observatory was designed with networks in mind. Administrators will appreciate Pinnacle's small file size of less than 10k per desktop and its ability to work over any protocol and NOS. With this bandwidth, lap tops can be secured over a phone line!



Another feature of the Desktop Observatory is that it allows administration of OS/2 clients with the current security server for network based applications. Regardless what NOS is being utilized by a firm, The Desktop Observatory will not build an object unless it can resolve its security checks. It cannot resolve these check unless users are correctly authenticated. The result is a user gets his/her appropriate desktop *whenever and wherever* they log on and the administrator does not have to redundantly maintain rights. No desktop need be provided until *after* a user has been authenticated (those interested in Single Sign-On should contact Pinnacle).

More on Security

Auditing is a common requirement for the security conscious. A full capability is built into The Observatory. This is integrated with the security daemon which includes the ability to restrict clever users from building their own objects to violate client security. Also, great pains are taken to reduce all exposures between power-on and the workplace shell. A special program was created to start

the shell (dskshell.cmd), insure networking starts correctly, and inhibit user's ability to interrupt the process via a cntl-break. Disabling the Alt-Fx function is a feature that can be engaged, if desired. Users can enable their hardware boot protection in the bios or call Pinnacle for a centrally distributable software solution.

Flexibility

There are circumstances where corporations do not need high security and only need the ability for users to get the appropriate desktop. In fact, this may be combined with the need for users to be able to modify their own desktop yet move from machine to machine—or what some customers refer to as a "follow me" desktop. Pinnacle uses MID (Mobile Independent Desktops) to provide this flexibility. MID simply utilizes the Finder function mentioned earlier to "snap" the desktop at log off and save the appropriate file to the network so it can be delivered at the next log on. This process applies to PowerPC desktops as well (the Observatory is provided on the PowerPC-OS/2 Application Sampler). End Users should not care what type of OS/2 machine they log onto and with Pinnacle's technology they don't have to.

Summary

Whether you are interested in security or centralized management and delivery of OS/2 desktops, the technology available through Pinnacle can save a great deal of heartache and headaches.

Pinnacle Technology, Inc. was founded in 1992 to bring four key elements to OS/2: 1) Centralized Management; 2) Security; 3) user-proof; and 4) bandwidth sensitivity. Pinnacle's unique means of efficiently delivering desktops (patent pending) is used on over 100,000 OS/2 workstations worldwide. Current products include The Desktop Observatory V4 (centralized desktop management and security), The Desktop Commander (centralized desktop management), and Kid Proof/2 (for stand-alone machines). They can be reached at (800)-525-1650, (317)-279-5157, www.pinnacletech.com, or ehenning@pinnacletech.com.

Eric Osmann was a member of OS/2 Workplace Shell development team at IBM and left in late 1995 to lead development at Pinnacle Technology, Inc. He resides with his family in Colorado Springs and can be reached through electronic mail at helpdesk@pinnacletech.com.

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and lost space, we looked at several of the machines in our office in terms of the drive's size and the number of files it contained. We use them here as an example. While a mix of files in other settings will vary from machine to machine, the general concept we present here with regard to lost space seems to hold true across the board. That is: As the size of the volume doubles so does the percentage of total disk space lost.

Table 2 shows the slack space wasted as disk volumes grow larger. It's based on the assumption that a typical 512MB volume will contain about 20,000 files. A volume half that size (256MB) should hold about 10,000 files; one double in size (1GB) should hold twice as many. See how the slack space dramatically increases as drives increase in size—your new 1GB disk drive is not able to hold twice the number of files that your old 512MB disk did. Why don't you get twice the storage? Because of the inefficiencies of the FAT file system.

The FAT file system provided an excellent solution for the limited needs of the early DOS and Windows applications. After all, in the early 1980s, the primary storage media was limited in size itself. First, there was the 180KB floppy, then came the 360KB floppy. Finally, we saw the 80286-class machines with 1.2MB floppies and huge 10MB hard-disk drives. Today, most applications will take at least 20MB of disk storage each, and the operating system may take more than 40MB for system files.

As PC technologies have progressed to provide faster processors, bigger applications, and larger hard disks, the limitations and inefficiencies of FAT-based file access begin to impinge on both the user and the operating system. Today, it is common to find ordinary desktop PCs purchased with 1GB to 2GB hard disks.

HPFS

Armed with an understanding of the mechanics of the file allocation table, it's time to look at how HPFS differs in its approach to storing data on your disk.

Table 2: Slack space in various sized disk volumes under the FAT system.

Volume Size	Cluster Size	Avg. No. of Files	Estimated Slack Space	Slack Space as % of Total Space
32 MB	½ KB	1,250	314 KB	1 %
64 MB	1 KB	2,500	1.25 MB	2 %
128 MB	2 KB	5,000	5 MB	4 %
256 MB	4 KB	10,000	20 MB	8 %
512 MB	8 KB	20,000	80 MB	16 %
1 GB	16 KB	40,000	320 MB	32 %
2 GB	32 KB	80,000	1.28 GB	64 %

The key is that the basic storage allocation unit is no longer a cluster. Instead, HPFS stores data using 512-byte sector boundaries—regardless of the disk's size.

To realize the impact this has on a disk, you need only compare two like-size volumes, one FAT and the other HPFS. For example, on a 128MB FAT-formatted volume with a 2K cluster, you need 2,048 bytes (one cluster) to store a file that is only 1,024 bytes long. When the same volume is formatted using HPFS, you need two 512-byte sectors or a total of only 1,024 bytes to store the same file.

HPFS Versions

The HPFS version describes the level of HPFS used to format the volume and has no correlation to the OS/2 version. The versions in use currently are 2.2 for small HPFS volumes, 2.3 for large HPFS volumes, and 2.4 for HPFS386 volumes.

In general, the *hpfs.ifs* and corresponding *uhpfs.dll* (in which the HPFS utilities **FORMAT** and **CHKDSK** are kept) are not dependent upon the operating system release. Normally, however, you want to run the versions that came with the retail version of OS/2 running on your system.

From time to time (between retail versions of OS/2), IBM releases FixPaks that correct a variety of very specific user-reported problems. They are quick fixes that not everyone needs or should apply. While the FixPaks should not break anything, it's always possible. Therefore, we recommend that you keep backup copies of your original *hpfs.ifs* and *uhpfs.dll*, so that you will have them should you need them.

Table 3 takes this example one step further by looking at what the impact will be of storing this same 1KB file on larger volumes with larger cluster sizes. Imagine the toll that downloading thousands of small message files (typically 256 to 1,024 bytes in size) has on a 1GB FAT-formatted volume, where 15Kbytes of space are lost for every 1Kbyte used.

How does HPFS resist fragmentation?

HPFS resists the tendency toward disk fragmentation, which is a part and parcel of a FAT-formatted drive, by virtue of the way that data storage is allocated on an HPFS volume. First, while the smallest storage allocation unit on a FAT-formatted drive is a 512-byte cluster, this is only the case when the volume is less than 32MB in size. By contrast, the only storage allocation unit on an HPFS-formatted drive is a 512-byte sector, regardless of the size of the drive.

Next, HPFS divides each volume into bands of 8MB—again, regardless of the size of the volume. Unlike the file allocation table with its fixed number of entries, HPFS creates as many 8MB bands as necessary to fill up the volume. Each band has its own free-space bitmap, with HPFS keeping statistics on each band. These statistics are used to select the most favorable bands for allocating space to a specific file.

Finally, HPFS attempts to keep a file's allocation localized and contiguous. Whenever possible, the file system preallocates additional contiguous space for a file to grow into, rather than having to store the file in a new location. Fragmentation is minimized by allocating files from separate data bands and preallocating contiguous file space.

Table 3: Comparing slack space for 1KB file stores under both FAT and HPFS.

Volume Size	Minimum FAT Cluster Size	Actual File Size	Lost Space on a FAT Volume	Lost Space on HPFS Volume
128 MB	2 K	1 K	1 K	None
256 MB	4 K	1 K	3 K	None
512 MB	8 K	1 K	7 K	None
1 GB	16 K	1 K	15 K	None

Why can't I access a drive that hasn't been correctly stopped?

Each time you correctly shut down your system, the file system is shut down, its buffers are flushed, and the "dirty read" flag on each HPFS partition is reset to "clean."

An HPFS drive that hasn't been shut down correctly can't be accessed because the file system sees the "dirty read" flag. The flag signals the file system that the drive was stopped before its free-space bitmaps could be updated to reflect changes to the drive's contents. To prevent damage caused by using those potentially inaccurate bitmaps, the file system requires that the drive be checked (using CHKDSK, the HPFS disk-checking utility) before any of the data on the drive is accessed. CHKDSK corrects any flaws and then releases the lock.

Sometimes you may need to run CHKDSK more than once. That's because on an HPFS drive, the primary and secondary disk structures are checked and "cleaned up" in multiple passes of the CHKDSK program. Therefore, if there are errors on a drive, a single pass may not be enough. The program should be run again and again until no errors (or corrections) are reported.

Why aren't there any HPFS floppies?

We can fall back on definitions, according to IBM's Doug Azzarito. Because the HPFS specification says in writing that HPFS does not support removable media, you can't have HPFS-formatted floppies! It's not a case of its being technically impossible (after all, you could trick OS/2 into thinking that a floppy disk is not a removable disk)—it just doesn't make sense.

The more logical reason that no HPFS-formatted floppies exist is because of the file system's use of the lazy-write cache. In order to improve system performance, data is held in memory cache

buffers and written to disk when the disk is idle. If the target media is removed before the file system writes the cached data to disk, the data is lost.

However, the data held in the cache buffers is not lost if, prior to removing the media, HPFS is notified. The media itself must do this by providing a signal for HPFS that causes the file system to

unfortunately, the constant monitoring of the floppy's boot sector makes using an HPFS-formatted floppy more painful than beneficial.

Newer, more sophisticated removable media is capable of notifying the file system of changes in media and avoiding the necessity for the file system to constantly monitor the media's boot sector; someday, they may be HPFS formatted.

Why is there a limit on HPFS cache size?

HPFS is an OS/2 installable file system. This IFS mechanism defines the interface between the operating system and the file system. One interface is the memory allocation available to the IFS. The memory available for use by the IFS is limited by the OS/2 kernel and is currently fixed at 2MB. To increase the HPFS cache size, either the OS/2 kernel will have to remove the limitations, or a non-IFS program will have to allocate memory for HPFS.

HPFS is based upon a 16-bit memory model (remember, all physical device drivers in the OS/2 world are 16-bit). Memory cache blocks are allocated during initialization of the IFS as OS/2 boots, based upon the cache size specified on the IFS's command line in your *config.sys* file.

HPFS uses cache memory as 2K cache blocks—thus a 2MB cache (/CACHE:2048) contains 1,024 cache blocks. Each cache block must have a corresponding BuffNode (a cache block pointer). Because HPFS is a 16-bit implementation, its global data segment (limited to 64K bytes) can only hold so many cache block pointers. For example, 1,024 cache blocks at 59 bytes per cache pointer gobbles up 59K of the 64K global data segment.

How should you set the HPFS cache parameters?

One of the most powerful features

What is HPFS386?

Historically speaking, HPFS386 is the original High Performance File System, designed by Gordon Letwin of Microsoft. It was intended to be used exclusively with the Microsoft LAN Server product and was written in assembler language.

HPFS386 uses special, undocumented interfaces to and from the LAN Server code. These speed up disk I/O (input/output) by allowing I/O requests to go directly from the file system to the network adapter. The result is disk I/O with less overhead and speedier response to network client requests for disk access.

Today, HPFS386 is available with IBM's Advanced LAN Server product. While it is compatible with HPFS, it also includes the following features specifically designed for LAN use:

- Access Control Lists (ACLs)—to allow user permissions to be set on a file-by-file basis.
- DASD Limits—to allow the LAN administrator to control the use of free disk space on a per-user basis
- Separate Control Program—to allocate cache for the file system and allow cache parameters to be set independently for each volume.

Because most desktop PCs running OS/2 Warp aren't Advanced LAN Servers, and, therefore, would not stand to benefit from the additional network features included in HPFS386, there is no reason for them to run HPFS386 instead of standard HPFS.

Table 4: Guidelines for setting cache parameters for systems running OS/2 2.x or later.

<i>HPFS Partitions Only</i>						
RAM	Cache	Lazy Writes	MaxAge	DiskIdle	BufferIdle	Other
16MB	2048	/lazy:on	40000	30000	20000	REM out the DISKCACHE statement
12MB	1536	/lazy:on	40000	30000	20000	REM out the DISKCACHE statement
8MB	1024	/lazy:on	40000	30000	20000	REM out the DISKCACHE statement

<i>FAT Partitions Only</i>						
RAM	Disk Cache	Lazy Writes	MaxAge	DiskIdle	BufferIdle	Other
16MB	2048	/LW	N/A	N/A	N/A	REM out IFS=HPFS.IFS statement
12MB	1536	/LW	N/A	N/A	N/A	REM out IFS=HPFS.IFS statement
8MB	1024	/LW	N/A	N/A	N/A	REM out IFS=HPFS.IFS statement

<i>HPFS & FAT Partitions with HPFS Active</i>						
RAM	Cache	Lazy Writes	MaxAge	DiskIdle	BufferIdle	Range for DiskCache Value
16MB	2048	/lazy:on	40000	30000	20000	512 - 1024
12MB	1536	/lazy:on	40000	30000	20000	256 - 512
8MB	1024	/lazy:on	40000	30000	20000	128 - 256

<i>HPFS & FAT Partitions with FAT Active</i>						
RAM	Cache	Lazy Writes	MaxAge	DiskIdle	BufferIdle	DiskCache
16MB	1024	/lazy:on	40000	30000	20000	2048
12MB	768	/lazy:on	40000	30000	20000	1536
8MB	512	/lazy:on	40000	30000	20000	1024

available in the High Performance File System is the optional cache-tuning parameters for lazy writes—that is, postponing writing data to the hard disk for a short period of time to maximize the applications' performance. These can significantly enhance system performance.

The FAT cache only allows you to turn lazy writes on or off. The HPFS cache lets you also adjust the settings for **MaxAge**, **DiskIdle**, and **BufferIdle** on-the-fly, using the **CACHE** command followed by the appropriate parameter:

MaxAge—Elapsed time (in milliseconds) that can expire since the last write to your physical disk occurred, regardless of how many times the data held in the HPFS cache buffers may have been updated.

DiskIdle—Elapsed time (in milliseconds) that the disk controller can be inactive before the lazy writer will write data held in HPFS cache buffers to your physical disk, regardless of the **MaxAge** and **BufferIdle** settings.

BufferIdle—Elapsed time (in milliseconds) before the lazy writer writes the

data held in HPFS cache buffers to your physical disk.

We recommend that the number of milliseconds specified for **MaxAge** be greater than that specified for **DiskIdle**, and, that the number of milliseconds specified for **DiskIdle** be greater than that specified for **BufferIdle**. There are no "correct" settings that are applicable for every system. They vary depending upon the type and volume of disk I/O on a system.

The guidelines in Table 4, for setting cache parameters, apply to any system running OS/2 2.x through OS/2 Warp. To determine which settings would be best for your system, select the appropriate section of Table 4. Make your choice based on whether your system is formatted as HPFS-only or FAT-only, or using both with either HPFS or FAT "active."

For our purposes, **active** and **passive** are descriptors of the way a partition is used. If it is seldom used, consider it **passive**. If a lot of disk-intensive I/O occurs on the partition, consider it **active**. Because swapper I/O does not

pass through the normal system cache, it does not have any bearing on whether you should consider a drive **active**.

Remember, the right setting for your particular system will depend upon the type of applications you are running and the amount of RAM in your computer system. However, the higher the values are for the **MaxAge**, **DiskIdle**, and **BufferIdle** parameters, the more latitude the lazy-writer will have as it prioritizes requests.

Finally, based upon the file system and cache-tuning testing we did in conjunction with developing DCF/2, we discovered the following to be true:

- HPFS actually requires 128 to 130K of committed memory, as opposed to the widely perceived 512K. As cache size increases to 2MB, this requirement increases as well, up to a maximum of about 240K.
- The optimal cache size seems to be 1,536.
- When comparing the relative merits of HPFS versus FAT: On partitions of identical size, HPFS gives you about



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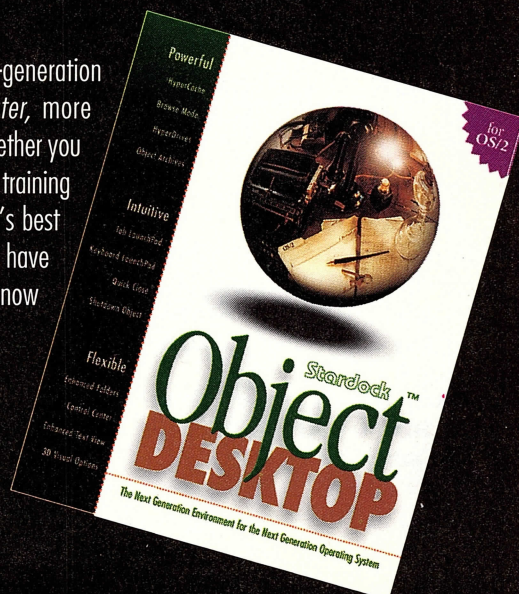
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Other HPFS Benefits

The High Performance File System was designed specifically to address key issues such as lost storage. But HPFS offers more than better handling of slack space. Other advanced features that make HPFS a superior file system are: integrated Extended Attributes, multithreaded I/O, and strategic allocation of directories.

Integrated Extended Attributes

Extended Attributes contain information about a file. File attributes on a FAT volume are limited to simple read-only, system, hidden, and archive flags. File attributes on an HPFS volume are called Extended Attributes (EAs) because they provide not only these basic flags but also allow for highly generalized file information (similar to environment variables) to be kept with the file.

We feel that the single most important feature of HPFS is the way it integrates a file's Extended Attributes with the file itself rather than placing them in a separate file. For example, on a FAT-formatted volume, a file's EAs are stored in an external file, `EA_DATA_SF`; on our 450MB FAT-formatted volume, that `EA_DATA_SF` file is a 5MB file—scattered all over the volume.

By contrast, on an HPFS-formatted volume, file-related information is stored directly within the file's basic disk structure. Space permitting, the file's EAs are contained directly in a file or file directory's Fnode. Otherwise, EAs are kept in normal disk sector storage in runs pointed to by the Fnode allocation data structures.

Why are integrated EAs so important? Because an advanced operating system like OS/2 uses EAs to maintain key information about certain files. In particular, many of the operating system components require specific extended attributes—on a FAT-formatted boot disk, where these EAs are contained externally in the `EA_DATA_SF` file, the EAs may become cross-linked. Unfortunately, the prescription for recovery usually calls for a complete reinstall of the operating system. Because extended attributes on an HPFS-formatted volume are integrated, they cannot be inadvertently cross-linked.

Multithreaded I/O

The benefit of HPFS's multithreaded I/O is improved system performance. Multiple operations happen concurrently, in the background, or when the disk controller is idle. Disk I/O is distributed evenly and the processor used more efficiently.

HPFS uses caching extensively. Caching involves allowing data being written to disk to actually be written to high "memory cache blocks," which are then later "lazy-written" to physical disk storage.

Strategic allocation of directories

FAT design is based upon a linear table of entries that must be searched from the beginning when a file or directory is requested. By contrast, HPFS places key directory and file information near the seek-center of the drive and employs a highly efficient, binary tree mechanism in search operations. The result is vastly reduced disk head movements and search times, especially on large volumes.

In addition, built into the HPFS implementation is special file and directory name caching, known as the "look-aside" naming cache. Each directory and file name in the cache is represented by a check-sum (a single 32-bit value). When the cache is searched for a particular directory or file name, the search requires only one single, 32-bit compare, as opposed to comparing every byte, byte-by-byte, of a potentially very long file name, in order to determine if it is target directory or file. This makes searches of HPFS volumes faster and more efficient.

15% more space, and performance is about 28% better.

- Instead of continuing to increase performance, a `DISKCACHE` value in excess of 2,048 seems to degrade performance rather than improve it.

Do any other operating systems use HPFS?

What about NTFS?

Microsoft's *Windows NT* supports HPFS. There are also third-party developers

who have created HPFS-compatible drivers for DOS, Linux (a new version of the UNIX operating system), and other operating systems. Users of *Windows NT* probably use a similarly named file system, NTFS, the New Technology File System, rather than HPFS.

HPFS obviously predates *Windows NT* and its NTFS. Both share a common goal: They are designed to compensate for the inadequacies of the file allocation table in light of today's multigigabyte

disks and multitasking operating environments. They provide improved performance on large volumes, more efficient data storage, and greater reliability than the FAT file system.

According to Microsoft's Gary Kimura, co-architect and developer of NTFS, several significant differences exist between NTFS and HPFS. First and foremost is that NTFS is truly a 64-bit file system capable of supporting almost infinitely large files. Another major difference is that NTFS is a recoverable file system—NTFS journals disk transactions so completely that `CHKDSK` is unnecessary. On the other hand, NTFS takes after the FAT system in that it doesn't always store data at 512-byte sector granularity; NTFS uses a cluster-like storage unit, which grows in size as the size of the volume grows.

Another factor in "comparing" *Windows NT*'s NTFS with OS/2's HPFS is that Microsoft has incorporated an extremely efficient file-by-file compression subsystem into NTFS. IBM has not elected to provide compression with HPFS.

When should and shouldn't I use HPFS?

Some people insist that you should always use HPFS. Others caution that if backward compatibility with DOS is an issue, you may find a mixture of FAT and HPFS better suited to your needs.

If you use large databases, HPFS is preferable to FAT. Databases are usually large, randomly stored files. FAT is not well-suited to perform searches on such files as efficiently as is HPFS.

Is your system likely to crash on a regular basis, perhaps because you're developing and testing systems-level software? Our own experience in developing device drivers—and the improper shutdowns that are inherently a part of device driver development—leads us to suggest that a FAT-formatted volume is preferable in such a setting. The time HPFS needs to check an improperly stopped HPFS-formatted drive offsets any perceived performance benefits. In this case, you would find that you can get back to work faster if your system is FAT formatted rather than HPFS.

As a developer, is there anything I should consider when dealing with HPFS?

Opinion on this issue seems divided, too. One HPFS developer at IBM said

no, while another suggested that there are parameters that developers should take into account: **NEWNAME** and **FILESIZE**.

The **NEWNAME** parameter allows OS/2 to identify a program as compatible with HPFS support for long file names. This parameter is used when linking the program. The **FILESIZE** parameter helps minimize fragmentation of the data stored on an HPFS-formatted volume. If the **FILESIZE** parameter is set (when the **DosOpen** function is used to create a file) to whatever size the developer anticipates the file will have when closed, then HPFS knows how much space to allocate for the file and does so accordingly.

Conclusion

The High Performance File System is designed to address the needs of today's OS/2 user. It is capable of managing vast amounts of data on large volumes in a multitasking environment far more efficiently than FAT, in part due to:

- Storage allocation, based upon 512-byte sector boundaries, regardless of

volume size that minimizes the portion of your disk lost to slack space.

- Multithreaded design, extensive use of sophisticated caching techniques, and the lazy writer, which allow the file system to provide significantly enhanced system performance.
- Strategic allocation directories and files that allow HPFS to perform complex search operations with minimal disk head movement and greater efficiency than FAT.
- Design and data structures that allow it to allocate and preallocate contiguous file space, minimizing the disk's tendency to become fragmented.
- Support of long file names of up to 255 characters, which provides far greater file- and directory-naming flexibility than does the traditional eight-dot-three DOS convention.
- Integrated extended attributes for both the operating system and applications within its own data structures that increase the system's robustness and reliability.
- Volume integrity and data reliability that are managed while a volume is in use.

While DOS and its FAT file system have served users well, neither was ever intended for use on today's super-fast PCs with multigigabyte hard disks. Operating systems of the 1990s, like OS/2 Warp, demand a file system that can offer the features HPFS provides today.

Acknowledgements

We would like to extend our thanks to both Felix Miró and Doug Azzarito of IBM and to Gary Kimura of Microsoft for taking time to review some of the questions posed here and to offer suggestions and technical expertise. **OS/2**

Max and Sandy Eidswick are cofounders of Proportional Software. Max is a system architect, experienced with the DEC VAX systems and their multitasking operating environment. He designed and wrote Proportional's DCF/2, and Sandy wrote the online documentation and user's manual. Max is now providing consulting services for low-level device driver development. You can reach them at 71333.2765@compuserve.com.

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Introducing the Developer API Extensions

Introducing OS/2's support of the Win32 application program interfaces.

By David E. Reich

The IBM Developer API Extensions is just a fancy term for a set of programming interfaces corresponding in name and function to Microsoft's Win32 APIs. These interfaces won't mean much to the end user, other than when purchasing an application that uses them. To OS/2 developers, however, they allow you to write code and reuse it across operating platforms.

The Developer API Extensions (*editors' note: informally referred to as DAX*), was announced last May at the IBM Technical Interchange. At that time, an early version of the code was supplied to a number of developers. Last October, a full-functioned beta was released to a wider audience. By the time you read this, DAX functionality will be shipping in a version of OS/2.

The idea is to allow developers that write to Win32 to recompile their existing code as native OS/2 applications. This approach exploits some similarities of the OS/2 and Win32 API sets in order to write specific functions, thereby allowing OS/2 system services to be accessed through the same interfaces as Win32 applications.

Using DAX can be as easy as writing a Win32 program. It can also be a bit more complex if you're using these programming interfaces to migrate existing Win16 or Win32 code. If you want to exploit other functions in OS/2 that don't exist in Windows, such as the Workplace Shell, or if you want to write isolated modules to interoperate, some things must be taken into account. Let's explore what you should know to plan out your development and use DAX to its fullest.

Listing 1: Dapiskel.c, a sample application.

```
/*
   This is a skeleton of a DAX/Win32 application. Notice that there are
   no native OS/2 Presentation Manager function calls and this program
   conforms to Windows programming conventions. For fun, when you
   compile this, open the OS/2 Font Palette and drag and drop a font onto
   either the menu bar or client area and see what happens. Now try to do
   that with Win32 with the same source code....

   Required files for this program are:

   DAPISKEL.H
   DAPISKEL.RC (and the binaryIcon file referenced)
   MAIN.C      (From the toolkit)
   A makefile

   This program was compiled using IBM C/SET ++ V2.0
*/

/* When this is compiled for Win32, use windows.h, for OS/2, use
   os2win.h */
#include <os2win.h>
```

cont'd on p. 35

Developer API Extensions

Inside DAX

DAX extends the OS/2 API set to include a variety of Win32 APIs. In many instances, the DAX APIs are wrappers around a similar OS/2 API. In other cases, extensive functionality was written underneath the API, and within OS/2 itself, to perform the required function. Sometimes, existing function was enhanced, and other times, new subsystems were written. Some examples of new functions include new dialogs, such as **find** and **replace**, and the new standard **print** dialog.

There were many considerations when implementing these functions, such as the inverse coordinate systems between OS/2 and Windows. OS/2's origin of 0,0, in presentation spaces, is the lower left of a region, where Windows uses the upper left for 0,0. It was a design goal for the DAX team to allow users to intermix many, but not all, OS/2 and Win32 calls for common resources. A general rule of thumb is to intermix message-based operations, not handles. For example, sending messages from an OS/2 window procedure to a DAX-created window works great.

In some cases, DAX calls can't operate on native Presentation Manager structures, and OS/2 calls can't operate on structures created with DAX calls. These differences, such as the GDI calls and others, are described fully in the DAX programming reference that is part of the OS/2 Developer's Toolkit on the Developer's Connection CD-ROM, volume 9.

That programming guide will list the DAX API set and the more than 300 supported messages.

Many people have been interested in how many and which of the Win32 functions and messages are implemented in DAX. IBM worked with software developers, analyzing over nine million lines of Windows application source code, to establish the most commonly used programming interfaces to determine the list of APIs for the first implementation release of DAX. From that list, functional categories were rounded out and other critical, yet less frequently used, functions were added. In general, there are more than 700 APIs and 300 messages supported in the first release of DAX.

Making DAX plans

When planning your application development, first look at how much source code you want to have common to the Windows and OS/2 platforms. Because there are functions available in OS/2 that aren't in Windows, and because the entire Win32 API set isn't included in DAX, you need to decide how to structure your code in order to isolate those functions and make the most of the code that can be common (Listing 1).

One decision you'll have to face: whether to migrate or port existing code, or to write from scratch. The former has advantages in that you can use existing operational code to start with and can add to or change it. Many times, this is

less expensive than writing new code. On the other hand, whether you are porting code from Win16 to Win32, using DAX, or going straight to OS/2, remember that Win16 and DOS are single threaded, while both Win32 and OS/2 are multithreaded API sets. Just adding to existing single-threaded code does not effectively exploit the advanced function.

When migrating from a single-threaded code base to multiple threads, virtual memory, and other such advanced functions, a level of rearchitecture will need to be accomplished. Take into account concurrency issues, in addition to protection issues and

Listing 1: *Cont'd from p. 34.*

```
/* #include <windows.h> */

#include "dapiskel.h"
char szClassName[] = "SkelClass"; /* My Class Name */
char lpstrSkelMsg[] = "Skeleton"; /* The message in the Window */
int XSize = 175; /* Initial Window Width */
int YSize = 150; /* Initial Window Height */
/* Remember, using the Windows coordinate system!! */

/*
 * WinMain is called from Main.C
 */

int WINAPI WinMain (HINSTANCE hInst,
                    HINSTANCE hPInst,
                    LPSTR lpszCmdLine,
                    int nCmdShow)
{
    MSG lpMsg;
    WNDCLASS wcSkel;
    HWND hWnd;
```

cont'd on p. 36

Listing 1: Cont'd from p. 35.

```

wcSkel.lpszClassName = szClassName;      /* My Class name handle */
wcSkel.hInstance = hInst;                 /* The Instance handle */
wcSkel.lpfnWndProc = WndProc;             /* My window proc */
wcSkel.style = CS_HREDRAW|CS_VREDRAW;     /* HorV chg cause redraw */
wcSkel.cbClsExtra = 0;                   /* Don't want extra class */
wcSkel.cbWndExtra = 0;                   /* or window words */
wcSkel.hCursor = LoadCursor(NULL, IDC_ARROW); /* No spcl cursor or */
wcSkel.hIcon = LoadIcon(hInst, MAKEINTRESOURCE(IDI_ICON)); /* icon */
wcSkel.lpszMenuName = MAKEINTRESOURCE(SKELMENU); /* Menu resource */
wcSkel.hbrBackground = GetStockObject(WHITE_BRUSH); /* White bkgnd */

if (!RegisterClass (&wcSkel) )           /* If Register class fails */
    return FALSE;                        /* Return to caller and terminate */

hWnd = CreateWindow(szClassName,          /* Class string */
                   "DAPIE Skeleton",      /* Title bar string */
                   WS_OVERLAPPEDWINDOW,  /* Style */
                   XSize,                 /* Initial X Placement */
                   YSize,                 /* Initial Y Placement */
                   XSize*2,               /* Initial Width */
                   YSize*2,               /* Initial Height */
                   (HWND) NULL,           /* (HWND) NULL */
                   (HMENU) NULL,          /* (HMENU) NULL */
                   (HANDLE) hInst,        /* The instance handle */
                   (LPVOID) NULL);       /* NULL Extra Data */

ShowWindow(hWnd, nCmdShow);              /* Show the Window */
UpdateWindow(hWnd);                      /* Make sure client is updated */

/* While I have messages, dispatch them till I fall out of the loop */

while (GetMessage(&lpMsg, NULL, 0, 0))
{
    TranslateMessage(&lpMsg);
    DispatchMessage(&lpMsg);
}

return (lpMsg.wParam);                   /* Return to main to terminate */
}

/*

Main Window Proc

I'm not annotating the messages and their handling as it should be
intuitive from the code.

*/
LRESULT CALLBACK WndProc(HWND hWnd,
                          UINT msg,
                          WPARAM Param1,
                          LPARAM Param2)
{

```

cont'd on p. 38

virtual devices—your program is no longer the only thing using system resources. Be sure to perform tasks using structured system resources and coordination tools, otherwise you'll be bumping into other programs and not doing things very well.

Mixed-mode code

Another important factor to consider is the matter of mixed-mode code, where both native OS/2 and DAX (Win32) API calls are in the same source file. Due to the many similarities between the Windows and OS/2 programming interfaces, each flavor of the APIs can (and in many cases do) use the same named structures, with slightly different definitions. As a result, if you try to mix some OS/2 and DAX function calls in the same source file, the structures that get included in the .h header files will be multiply defined, resulting in compiler errors.

When writing DAX source modules, the master header files you will use is *os2win.h*. When writing pure OS/2 source files, the master header file is *os2.h*. Just be sure to not include both .h files in the same source module. The changes you need to make should become apparent.

As previously mentioned, sometimes OS/2 API calls can't be used on DAX-created resources and vice versa. This isn't because of mixed-mode code. What this discussion refers to is how you structure your source code files.

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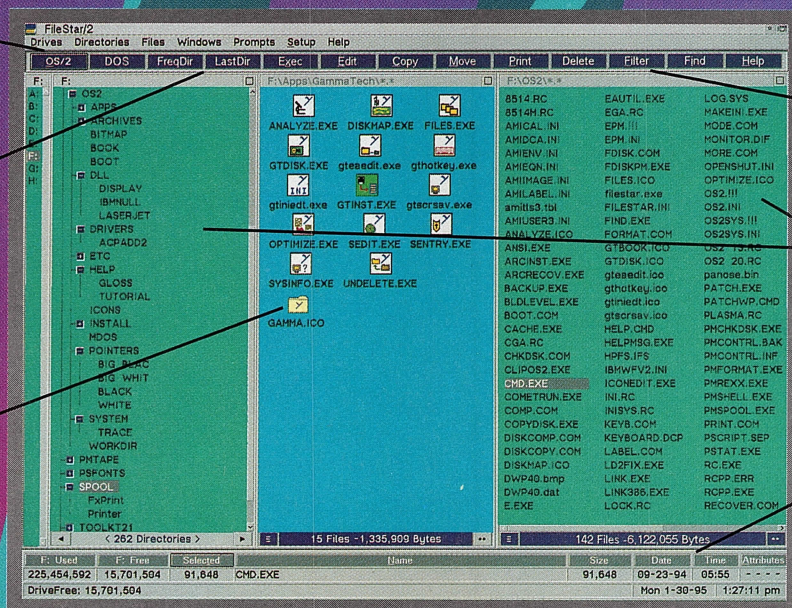
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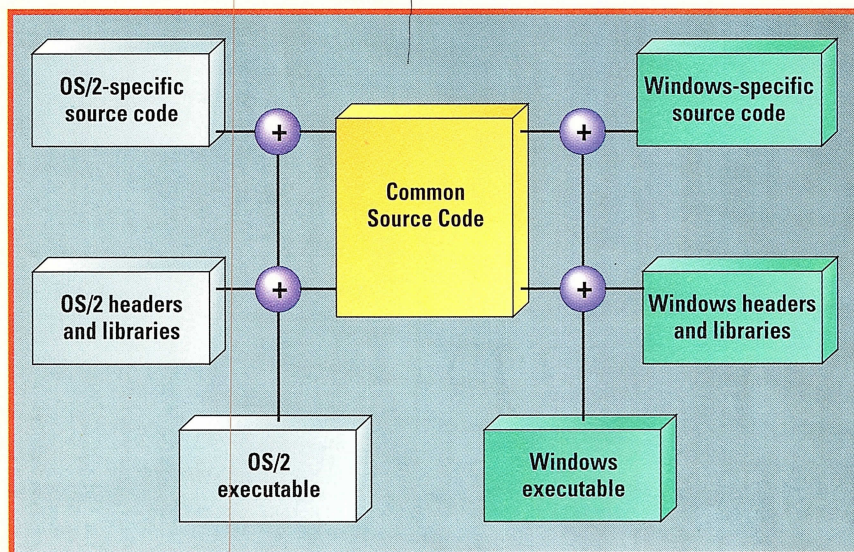


Figure 1: How to manage your source code efficiently.

The simple remedy for the mixed-mode code issue is to separate native OS/2 and DAX function calls into different source files.

Mixed-mode code is another reason to think twice about migrating existing source to 32-bit code, especially when using DAX. Not only will you need to rearchitect for the various new functionality in the 32-bit environment, but you'll now need to potentially separate function calls from the areas of code they are used to living in.

Although not directly related to DAX, another mixed-mode code issue refers to using both 16- and 32-bit code in the same program. While OS/2 supports 16-bit code, DAX only supports Windows 32-bit APIs. I strongly recommend you use pure 32-bit code to ease migration to their platforms: For example, OS/2 for the PowerPC only runs 32-bit applications natively. While it does run Win-16 applications, it is only in binary compatibility mode. The power of DAX and the OS/2 API are the protected, multithreaded, virtual resource functions provided to applications in a platform-insensitive fashion. What you're able to do if you stick with 16-bit code has limits—so bite the bullet now and go right to well-structured 32-bit code.

Listing 1: Cont'd from p. 36.

```

//      static HINSTANCE hInst;          // used for dialog box
SIZE mySize, *lpSize=&mySize;          /* To determine where to draw text */
HDC hDC;                                /* DC for output */
PAINTSTRUCT hPS;                        /* PS for output */

switch (msg)
{

case WM_DESTROY:
    PostQuitMessage(0);
    break;

case WM_PAINT:
    hDC = BeginPaint(hWnd,&hPS);
    GetTextExtentPoint(hDC,
                        lpstrSkelMsg,
                        strlen(lpstrSkelMsg),
                        lpSize);

    TextOut(hDC,
            (XSize-(lpSize->cx))/2,
            (YSize-(lpSize->cy))/2,
            lpstrSkelMsg,
            strlen(lpstrSkelMsg));
    EndPaint(hWnd,&hPS);
    break;

case WM_SIZE:
    XSize = LOWORD(Param2);
    YSize = HIWORD(Param2);
    break;

case WM_COMMAND:
    switch (LOWORD(Param1))

```

cont'd on p. 40

Getting started

Now that you've decided the direction you're going to take, let's look at how to get where you want. If you are writing code from scratch, the road is easy: Analyze what you want to do, referring to Figure 1 for your OS/2- versus Windows-specific functions. Separate the OS/2 source code from the DAX functions and start coding. To maximize your results, stick to the DAX API set as much as possible, and you'll get

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*The Consumer Electronics Manufacturers Association was formerly known as the Electronic Industries Association/Consumer Electronics Group.

Listing 1: Cont'd from p. 38.

```

{
    case ID_BEEPME:
        Beep(200,200);
        break;

    case IDM_EXIT:
        PostQuitMessage(0);
        break;

    default:
        return(DefWindowProc(hWnd,msg,Param1,Param2));
}
break;
default:
    return(DefWindowProc(hWnd,msg,Param1,Param2));
}
return(0L);
}

```

Listing 2: Dapiskel.h, a sample header file.

```

LRESULT CALLBACK WndProc(HWND, UINT, WPARAM, LPARAM);

#define IDM_BEEPME 1
#define IDI_ICON 2
#define IDM_EXIT 4
#define ID_BEEPME_NOW 8
#define SKELMENU 106
#include <os2.h>
#include "dapiskel.h"

```

a high level of reuse and less work to do when working on the other platform.

If you plan to do any code migration, start looking at tools to aid the effort. IBM has worked with OneUp's SMART tool set (Developer's Connection) to develop a UDMD (User Defined Migration Dictionary) specifically for DAX. It understands Win16 and Win32 APIs, as well as the DAX API and message set. By using the SMART tool set with the DAX UDMD, you can analyze your existing code, whether you are first moving to 32-bit code or just looking at your Win32 application to make it cross-platform.

The SMART tool set will analyze the code, tell you which of your functions have OS/2 or DAX counterparts, and provide recommendations on how to

change your source code. Because it uses a keyword replacement algorithm, it is limited in what it can recommend in the way of restructuring the code for DAX or in rearchitecting it for multiple threads or virtual memory. What it does provide is an idea of what it will take to move your code to be more platform neutral. If you have code that you're thinking of migrating, SMART should be an integral part of your decision-making process.

Whether you are using SMART, or writing from scratch, good design is important and you should spend time mapping out the application before you start coding. With the DAX mixed-mode coding considerations, along with the natural division of platform-specific and neutral functions, the right

design can make the job significantly easier.

While most programmers don't usually bother with the sample code in the OS/2 Programmer's Toolkit, I suggest making an exception in this case. This code was originally written for Win32 and migrated to DAX to be platform independent. Most of the changes were made to the compiler and *make* files.

Most specifically, be aware of the **main.c** function (included in the toolkit's DAX sample code) that you need to use to operate the **WinMain** function required by Windows programs. This is simply a C-language file stub that needs to be linked in, allowing you to call the appropriate functions from your DAX program.

Likewise, there is a **dllmain.c** for DLL initialization and termination. This, along with **main.c**, is needed to assist with the architectural differences between OS/2 and Windows. As with **main.c** for executable programs, just add the compilation of **dllmain.c** to your *make* file and link it in with any DLLs you may be building that utilize DAX.

Resources

Resources are an interesting issue because, although the fundamentals for both OS/2 and Windows are the same, subtle differences do exist. Don't forget to look at binary resources, such as bitmaps, *.hlp* help files, and string tables. After all, DAX, as well as native OS/2 APIs, will only operate on native OS/2 resource files. As such, you will need to keep some common source for creating the resource binary files, or convert them to OS/2 when needed.

Several tools are at your disposal to create or convert these resources to OS/2's format. My recommendation is the Universal Resource Editor (URE, available on the Developer's Connection disk) for resources other than *.hlp* files. For the latter, Hyperwise Lite (also on the Developer's Connection) is my preferred tool.

The SMART tool set will also convert resources and help files for you, but it's merely a conversion. The URE and Hyperwise tools allow you to maintain

Listing 3: Dapiskel.rc, a sample resource file.

```

ICON      IDI_ICON      DISCARDABLE      "icon.ico"

MENU SKELMENU DISCARDABLE
BEGIN
    SUBMENU "~BeepMe", 0xF001
    BEGIN
        MENUITEM "BeepMe~Now!",      ID_BEEPME NOW
    END
    SUBMENU "~Exit", 0xF002
    BEGIN
        MENUITEM "E~xit",      IDM_EXIT
    END
END
    
```

a common source code base and generate the resource you need rather than keeping a source base and re-migrating whenever changes are made.

Other than the changes discussed concerning separation of platform-specific and -neutral functionality, as well as the mixed-mode code issue, there's not much more to using DAX. When you use these functions, your Win32

code turns into a native OS/2 program. Even though Windows doesn't have a color palette or drag and drop, the same code, recompiled with DAX (a multi-line entry field for example), can accept colors or fonts dragged and dropped without any code changes on your part.

Imagine also running your IPMD debugger for the OS/2 application and

seeing your Win32 source code in it! After all, it's OS/2 source code now. If you still doubt it, whip out your Windows SDK, take the Multipad sample program, and try it.

DAX is a bit of an obscure topic to try to describe because you can't feel it, touch it, users can't see it on the glass, and no one can tell if you're using it or not. But that's also the beauty of it. You're the only one who has to know you're using it, because DAX drastically reduces your development costs to have cross-system, reusable source code.

OS/2

David Reich has been with IBM's OS/2 development team since 1987. He is a contributing editor of OS/2 Magazine, and the author of Designing High-Performance OS/2 Warp Applications. Dave can be reached at CompuServe 76711,632 or via the Internet at speed-racer@vnet.ibm.com.

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Tips and Tricks from Another Source

BY DICK GORAN

I'm sure that if you're either a professional programmer using REXX or a casual REXX user, you have a place where you store miscellaneous bits of information that you save for future reference. You then have to remember where that tiny fragment about some particular REXX command or function is salted away.

Bernd Schemmer of Frankfurt, Germany has made life simpler for all of us by collecting these REXX-related tidbits and publishing them collectively. If there's been a helpful suggestion or tip posted in any of the electronic forums devoted to REXX, it's a good bet that it is included in Herr Schemmer's collection. He updates this free file on a regular basis and amazes me with the breadth of the material he has gathered into a single document. His report is available on many electronic repositories with a file name of *rxtt18.exe* (the numeric portion of the file name indicates the file's release level). The self-extracting file expands into an *.inf* file that can be viewed and searched with the OS/2 View program like any of the system's *.inf* files.

Since Herr Schemmer's first language is German, you may occasionally find an incorrect word usage or grammatical structure, but the hundreds of items contained in his *Tips & Tricks* is otherwise well presented. He credits all of his sources and provides hyper-linked references to the appropriate source's e-mail addresses. Some of the subject matter is not explained in enough detail to provide a full explanation of the topic; however, the mere presence of the topic is frequently enough to provide insight into the matter being discussed. Table 1 contains a brief list of the hundreds of topics contained in *Tips & Tricks*.

While I'm pleased to say that I have

Table 1: Sample topics from *Tips & Tricks*.

- Change the WPS with REXX
- Communication & IPC
- Compound Variables
- Data Converting
- Database
- Date Converting
- Development & Debugging Tools
- Disk, Directory and File Handling
- File & Disk I/O
- General Hints for REXX
- Hints for PARSING
- Hints for Some REXX Functions
- IPC and Process Synchronization
- Keyword Instructions
- Literature
- Mathematical Routines
- Misc. Tools
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- REXX Language Extensions
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- REXXUTIL Functions
- Run-time Tests & Methods
- Sample Programs
- Sort Algorithms
- Troubleshooting
- Using ANSI Sequences
- Using QUEUES
- WPS Tools

contributed numerous items to this extensive collection of REXX-related items, I always manage to find something that makes me say, "I didn't

know that," each time I've looked over an updated version of his *Tips & Tricks*. With Herr Schemmer's permission, I have included some of the more obscure items. I have also made some minor corrections to spelling and grammar.

Special environment variables

The following environment variables have a special meaning for REXX programs:

RXTRACE—If the environment variable **RXTRACE** is set to **ON** before executing a REXX program, the REXX program is executed in single-step mode. This is the equivalent of including the REXX **TRACE** command with the parameter **?R**. Any other value for the **RXTRACE** variable is ignored by the REXX interpreter. To prevent the execution of a REXX program in single-step mode, even if the environment variable **RXTRACE** is set to **ON**, use the statement: **CALL TRACE 'OFF'** as first statement of your program. This is very useful to prevent tracing programs like **PMREXX** or a REXX program "compiled" with programs like **REXXCC**.

RXQUEUE—This environment variable contains the name of the queue that the program **RXQUEUE.EXE** (subcommand) should use if the queue name is **NOT** specified when **RXQUEUE** is launched. The default queue name used by **RXQUEUE** is the default REXX data queue name of **SESSION**.

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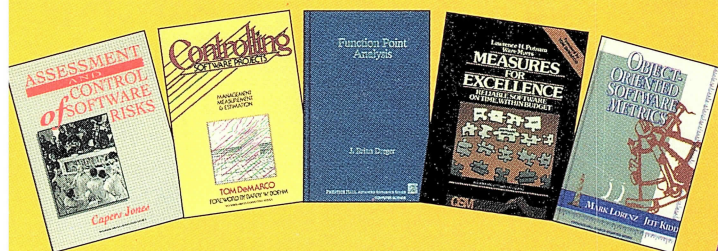
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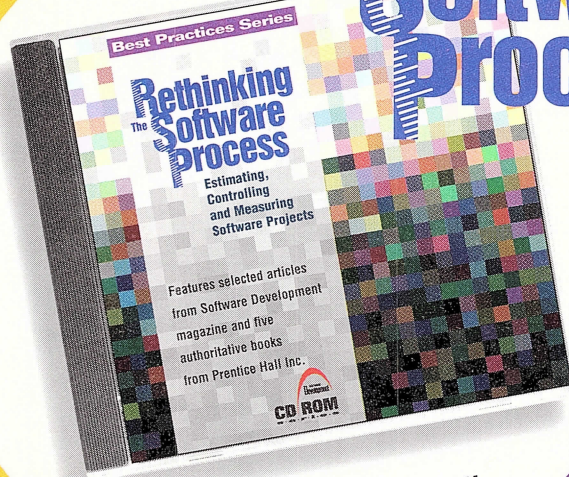
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Object REXX

As I write this column, I have come to the conclusion that Object REXX may have been left dangling in the breeze by IBM PSP. In addition, the person who has served as the lead developer of Object REXX for the past few years has moved on and is entrenched in his new surroundings at Lotus—not the IBM Glendale Laboratories in Endicott, NY. However, I have been told that the new REXXUTIL API that I wrote about in my August 1995 column will still be released with the next version of Warp (code name Merlin)—when and if that occurs.

Object REXX users who have been waiting for a newer beta than the one released on the DevCon 8 CD-ROM will have to wait for DevCon 10. The IBM Developer Connection folks in Boca Raton (devcon@vnet.ibm.com) have announced that the DevCon 9 CD-ROM will not contain any updates to Object REXX.

gram goes to the screen, regardless of the current target for **STDOUT**, use

```
call LineOut "CON",,
  "This output always goes to
  the screen!"
```

rather than outputting the line with the **SAY** instruction. To print messages to **STDOUT** or **STDERR**, you can use these names for the output device. For example:

```
* print a string to STDERR */
call LineOut "STDERR",,
  "This output goes to STDERR"
/* print a string to STDOUT */
call LineOut "STDOUT",,
  "This output goes to STDOUT"
```

To ensure that the input for your program comes from the keyboard, regardless of the current source for **STDIN**, use:

```
userInput = LineIn( "CON" )
```

Functions **LINEOUT** and **LINEIN** use normal file handles for the output devices. Therefore, close the device with the **STREAM** function after using it. There is no way to direct output to the handles 3 to 9 in REXX.

Special variables

A special variable is one that may be set automatically during processing of a REXX program. Three special variables are used by the classic REXX interpreter and five special variables in object-oriented REXX:

RC—This special variable contains the return code of the last external non-REXX command called; for example, OS/2 commands like **DIR** or **EAUTIL**. In case of a **SYNTAX** error, this variable is set to the syntax error number (1 to 99). After an **ERROR** or **FAILURE** condition, **RC** contains the command return code. Commands executed manually while tracing interactively do not change the value of **RC**.

RESULT—This special variable contains the return code of an internal or external REXX function if called with the **CALL** statement. The special variable **RESULT** is dropped if the REXX function doesn't return a return code. **RESULT** is also dropped if the function is called in an implicit or explicit assignment (**a = myFunc()**; if **myFunc() = 4** then).

SELF (object-oriented REXX only)—This special variable is set when a method is activated. Its value is the object that forms the execution context for the method (that is, the receiver object of the activating message).

SIGL—This special variable is set to the line number of the last instruction that caused a transfer of control to a label (any **SIGNAL**, **CALL**, internal function call, or trapped condition).

SUPER (object-oriented REXX only)—This special variable is set when a method is activated. Its value is the class object that is the usual starting point for a super-class method lookup for the **SELF** object.

All of these special variables can be changed just like any other REXX variable. You should save the values of the special variables in another variable if you want to use them in other statements.

Opening files

The default mode for opening files in REXX is **READ/WRITE** (even if you open the file implicitly with the **LINEIN()** function). This prevents other programs from opening the file, even if

the first program that opens this file only wants to read from it. To avoid this, you can use an explicit call to the **STREAM()** function to open a file in **READ** mode if you only want to read from it.

Closing files

Because the number of possible file handles is restricted in OS/2 sessions, you should always close every file you've opened as soon as possible. You also need to close a file (and perhaps reopen it again) if you want to call another program to write into or read from this file. You should only use

```
call STREAM filename , "C",
  "CLOSE"
```

to close a file. The other method, using **LINEOUT** or **CHAROUT**, without the second parameter, is only valid for files to which you have write access (even if you've only read from the file).

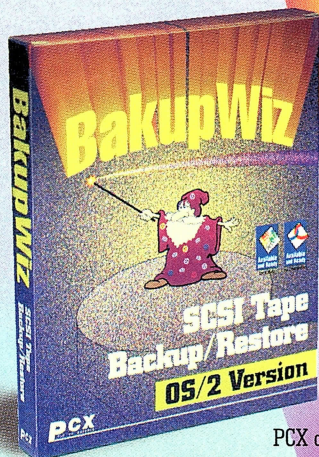
Tips & Tricks contains the most complete list of OS/2 REXX-related freeware and shareware that I've ever seen. Schemmer has also included information about all of the printed REXX books and articles currently available. *Tip & Tricks* almost has too much information in it. However, since it is in **.inf** format and viewable with the standard OS/2 **View** program, you can search it by keyword for items of particular interest to you. Schemmer includes instructions for converting the **.inf** file to ASCII text or HTML format for printing. **OS/2**

Dick Goran is the author of the REXX Reference Summary Handbook. He has been in the computer industry since 1961 and was in the IBM mainframe systems software development business until 1987. He teaches OS/2 REXX to corporate clients and lectures on OS/2. His free REXX utility programs can be downloaded from OS2DF1, Library 6 on CompuServe or from <ftp.cfsrex.com/pub>. He can be reached by e-mail at 71154.2002@compuserve.com.

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littleDogs, Polymorphism, and Frameworks

BY ROGER SESSIONS

The three pillars of object-oriented programming are encapsulation, inheritance, and polymorphism. Encapsulation and inheritance are well understood by most object-oriented programmers. However, many object-oriented programmers, even some with years of experience, are confused about polymorphism. Many do not even agree as to the meaning of the word.

What is especially interesting about this general state of confusion is that, of these three pillars, polymorphism is by far the most important. Encapsulation is nice, but hardly a major advance in the state of the art. Inheritance allows new functionality to be added to existing classes, but this is rarely useful in real life. Polymorphism, on the other hand, is the enabling technology for frameworks. Frameworks are one of the most important advances in code reusability since the invention of procedures.

Whoever coined the word "polymorphism" made a bad choice. The reason most programmers do not understand polymorphism is because the word itself is so intimidating. It's easy to relate to encapsulation and inheritance, terms for which we have intuitive feelings. But who can relate to polymorphism?

In this column, let's explore the concept of polymorphism. We could choose any number of object-oriented programming languages for the discussion, because all support this concept, but let's use IBM's SOM technology with the C language bindings.

Listing 1: Dog definition.

```
#include <somobj.idl>
interface dog : SOMObject {
    void print();
    void bark();
    implementation {
        releaseorder: print, bark;
        callstyle = oidl;
    };
};
```

SOM is IBM's foundational object-oriented strategy. It has long been associated with OS/2, but is now becoming available on other IBM platforms such as MVS and AS400. I like SOM because it is language neutral. I can do my actual programming in many different lan-

guages. SOM has other advantages, which I will discuss in future columns.

Everything you need to know about polymorphism can be summarized in four words. If you can remember these four words, you will understand polymorphism:

littleDogs go woof woof

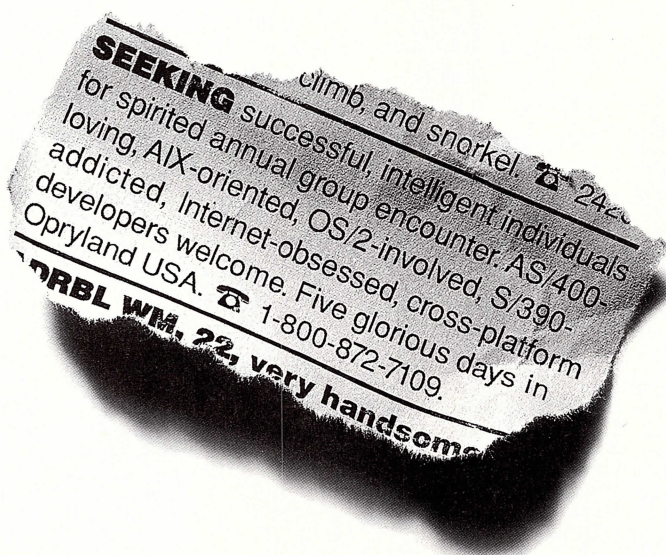
Let's see what this means. The word polymorphism comes from two Greek words, *polys*, meaning many, and *morpho*, meaning form. It's often used as an adjective, such as polymorphic method. It means that a class can have many forms of a given method, and the object run time can decide which will be used in a given situation. Orfali, Harkey, and Edwards, in their new book *The Essential Distributed Objects Survival Guide*, say "Polymorphism is a high-brow way of saying that the same method can do different things, depending on the class that implements it."

Let's look at a very simple SOM class. Listing 1 shows a definition of a dog. Our dog is derived from SOMObject, because in SOM all objects are derived, directly or indirectly, from SOMObject. Our dog has two associated methods, print and bark. A release order is included to ensure upward binary compatibility. An *oidl* callstyle is used to avoid passing around an environment variable, which is a good programming style, but superfluous to this discussion.

Listing 2 shows the dog's implementation. Most of the lines were generated by the

Listing 2: Dog implementation.

```
#ifndef SOM_Module_dog_Source
#define SOM_Module_dog_Source
#endif
#define dog_Class_Source
#include "dog.ih"
SOM_Scope void SOMLINK print(dog somSelf)
{
    somPrintf("My noise is ");
    _bark(somSelf);
}
SOM_Scope void SOMLINK bark(dog somSelf)
{
    somPrintf("generic dog noise\n");
}
```

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Listing 3: Dog client.

```
#include <dog.h>
main()
{
    dog Snoopie;
    Snoopie = dogNew();
    _print(Snoopie);
}
```

SOM precompiler. Two lines were added inside the print method and one line inside the bark method. The implementation of the bark method includes a standard SOM print statement and an invocation of the bark method. When invoking a SOM method in C, we pass the target object as the first parameter. The target object of the bark method is the same as the target object of the print method, thus we just pass through **somSelf** as the target parameter.

Notice that the invocation of the bark method inside print uses the form:

```
_bark(somSelf)
```

instead of the form in which the code is actually written:

```
bark(somSelf)
```

The underscore in front of the method name shows how, in the SOM C bindings, we invoke a method rather than a procedure.

When the print method is invoked, and it in turn invokes bark, what code will be called? The most logical guess would be the bark method that is implemented in the same file. This guess appears to be validated by the client program (Listing 3). The program in Listing 3 instantiates a dog named Snoopie and asks him to print himself. The output that this program generates is:

```
My noise is generic dog noise
```

It's crystal clear that dog's print invokes dog's bark. The output is as expected, and no other candidate bark method exists.

Now let's slightly complicate the situation. Listing 4 defines bigDog. bigDog is derived from dog. It adds no new

methods, but overrides one of the dog methods: bark. Overriding means that it redefines what it means to bark for bigDog. The bigDog implementation of bark is shown in Listing 5. You can see from the print statement that bigDogs bark quite differently than dogs.

Listing 6 defines yet another dog, a littleDog, also derived from dog, and also redefining the bark method. Its implementation is shown in Listing 7.

Listing 4: bigDog definition.

```
#include <dog.idl>
interface bigDog : dog {
    implementation {
        override: bark;
    };
};
```

Now we have three versions of bark, one for dog, littleDog, and bigDog. How will the system sort this out?

In Listing 8 a client program that instantiates Snoopie (a dog), Toto (a littleDog), and Lassie (a bigDog) is shown. It invokes print on each of these objects. Looking back on Listing 2, inside the implementation of dog's print we see a simple invocation of bark. No visible branch code exists. The invocation of bark is unconditional and unequivocal.

So what output do we expect from the program in Listing 8? With standard C procedural calls, we would expect the same version of bark to be invoked in each case. The most likely output from this program would be:

```
My noise is generic dog noise
My noise is generic dog noise
My noise is generic dog noise
```

One of these lines would come from each of the three dog print invocations, using the target objects Snoopie, Toto, and Lassie, respectively. The actual output this action generates is quite different. It is:

```
My noise is generic dog noise
My noise is woof woof
My noise is WOOF WOOF WOOF WOOF
```

It's clear that the dog's print behaves very differently when invoked on each dog. When invoked on Snoopie, it invokes the dog's bark. When invoked on Toto, it invokes the littleDog's bark. When invoked on Lassie, it invokes the bigDog's bark. This response is true even though the exact same print (dog's) is invoked in all three cases. We know it's the same print method in all three cases because only one print method is defined (and implemented)—dog's. This ability of print to automatically route to different bark implementations based on the type of target object is called polymorphism.

The contrast between polymorphic resolution and standard procedural resolution is seen by changing a single

Listing 5: bigDog implementation.

```
#ifndef SOM_Module_bdog_Source
#define SOM_Module_bdog_Source
#endif
#define bigDog_Class_Source
#include "bdog.ih"
SOM_Scope void SOMLINK bark(bigDog somSelf)
{
    somPrintf("WOOF WOOF WOOF WOOF");
}
```

Listing 6: littleDog definition.

```
#include <dog.idl>
interface littleDog : dog {
    implementation {
        override: bark;
    };
};
```


character in our program. By removing the underscore in front of the bark invocation within the print implementation in Listing 2, the same client program gives a very different result.

```
My noise is generic dog
noise
My noise is generic dog
noise
My noise is generic dog
noise
```

Using the underscore in front of bark tells SOM to use polymorphic method resolution. By removing the underscore, SOM assumes we are making a standard procedure call. Standard procedure resolution says that all calls to a given procedure name route to the same code location. In this case, that location is the dog's bark.

Obviously polymorphic resolution must be accomplished at run time, not compile time. At compile time, print only knows about dogs. It has no way to know that it will someday be invoked on a littleDog. In fact, it doesn't even know that such things as littleDogs exist. Only at run time can we look at the actual type of a target object and route accordingly.

Without polymorphic resolution, Toto would be forever constrained to making a "generic dog noise." It is only through the run-time magic of polymorphic resolution that Toto can say "woof woof." That's all you need to know about polymorphism.

Frameworks

What does all this stuff have to do with frameworks? Frameworks are architectural contexts within which objects interact. Orfali, Harkey, and Edwards write, "a framework provides an organized environment for running a collection of objects."

Frameworks are important because they offer massive opportunities for code reuse. They take advantage of the fact that

nearly all of the interactions between objects can be defined generically.

However, in order for a framework to be useful, it must be extensible.

Extensibility means working with a wide range of objects, including objects that the framework doesn't even know about. How can a framework function with unknown types of objects? The answer is through the use of polymorphic method resolution. The framework says, "I can work with any type of object, as long as it supports these methods." The framework assumes all objects are derived from some framework-provided base type, and each object type overrides the methods

it needs to specialize.

The program in Listing 8 can be thought of as a very simple framework; one that coordinates the bark activity of various dogs. You can add any dog type you want, as long as that type is derived directly or indirectly from dog and overrides the bark method.

An example of a more serious framework might be a GUI framework that allows objects to be dragged, resized, or hidden. The framework might provide a base type called **graphicObject**. The **graphicObject** could support a **repaintYourself**, which takes as parameters a screen area in which to repaint.

This framework might not have any idea what graphical objects will eventually be created. All it knows is that whatever those types are, they will be derived from **graphicObject** and will support the **repaintYourself** method.

Users of this GUI framework now have great technology for creating graphical objects. Suddenly they can have dogs, littleDogs, bigDogs, and animals of all types that support the very complex algorithms of drag, resize, and hide—courtesy of the GUI framework. All the objects have to know is how to repaint themselves.

Let's look at another example. Consider a phone company that needs to write a program to coordi-

Listing 7: littleDog implementation.

```
#ifndef SOM_Module_ldog_Source
#define SOM_Module_ldog_Source
#endif
#define littleDog_Class_Source
#include "ldog.ih"
SOM_Scope void SOMLINK bark(littleDog somSelf)
{
    somPrintf("woof woof\n");
}
```

Listing 8. littleDog and bigDog client.

```
#include <dog.h>
#include <bdog.h>
#include <ldog.h>
main()
{
    dog Snoopie;
    littleDog Toto;
    bigDog Lassie;
    Snoopie = dogNew();
    Toto = littleDogNew();
    Lassie = bigDogNew();
    _print(Snoopie);
    _print(Toto);
    _print(Lassie);
}
```

Listing 9: Phone definition.

```
#include <somobj.h>
interface phone : SOMObject {
    void determinePhoneNumber();
    string getNumberToCall();
    void dial(in string number);
    boolean connectionAccepted(in string number);
    void transmit();
    boolean connectionRequested();
    implementation {
        /* ... */
    };
};
```


Listing 10: Calling code.

```
number =
_getNumberToCall(myPhone);
_dial(myPhone, number);
if (_connectionAccepted(myPhone,
number)) {
    _transmit(myPhone);
}
```

Listing 11: Answering code.

```
if(_connectionRequested(myPhone))
{
    _transmit(myPhone)
}
```

nate the activity of many different types of telephones. The company needs this program to be highly modifiable. They know the phones they currently support, but not what new phone services will be offered in the future. They need to be easily flexible to be competitive.

might override this method and define a version that looks up numbers in a local database based on a two-digit key. Yet another system might use voice recognition technology to determine the calling number. The important point, from the framework's perspec-

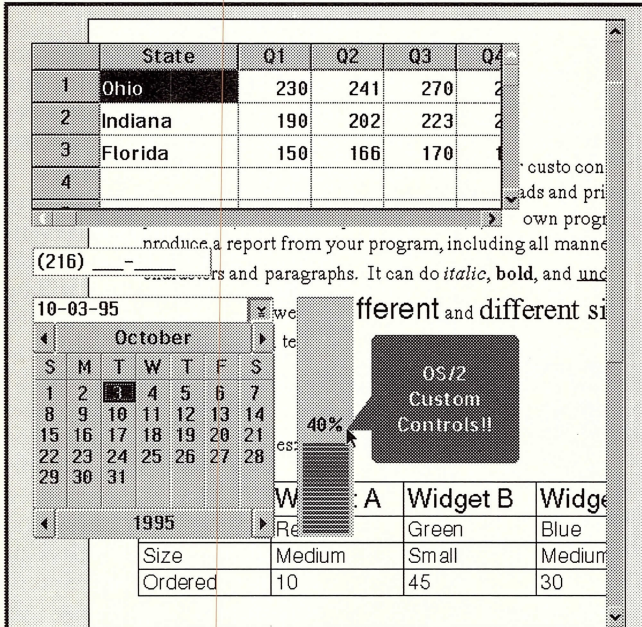
A framework is an ideal mechanism for this company. The company defines the basic expectations of a phone type (Listing 9). It then writes a framework that defines how phone objects will interact. The framework code, which defines one phone calling another, for example, might look similar to the example in Listing 10. This code depends on all phones supporting `getNumberToCall`, but does not depend on how those phones provide such support.

A generic phone type might support the `getNumberToCall` method by reading digits pressed on a touch pad. A new service, which supports speed dialing,

is not how `getNumberToCall` will be implemented, but only that it will be implemented as an override to the base method `getNumberToCall`, thus enabling polymorphic method resolution.

Framework technology is exciting. It provides a highly adaptable mechanism for developing and reusing code. Polymorphism is basic to frameworks. The same mechanism that allows Toto to say "woof woof" also allows a million-line framework, such as Taligent, to coordinate the activity of thousands of different types of objects. **OS/2**

Roger Sessions is president of ObjectWatch Inc. a company specializing in training and consulting in the use of SOM, DSOM, and related OO technologies. He has spoken at over 30 conferences and has written extensively. His books include Object Persistence: Beyond Object-Oriented Databases, Class Construction in C and C++; Object-Oriented Fundamentals, and Reusable Data Structures for C. Roger also publishes an Internet Newsletter called ObjectWatch on SOM, and can be contacted via e-mail at roger@fc.net.



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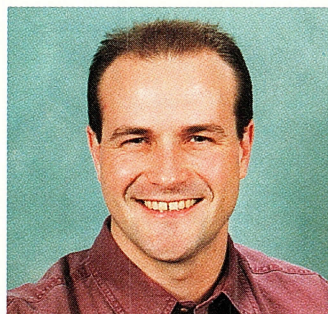
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Reader Service No. 22

A Lesson in Iconography

BY MARK BENGE AND MATT SMITH



Last month, we showed you what Raster Operations (ROPs) are and how they relate to bitmaps. We mentioned that the real power of ROPs emerges when you use them in combination with each other. This concept is used in both icons and mouse pointers. Depending on the type of image, three different ROPs are used to draw a pointer or icon.

What's in an icon?

Icons are, in reality, bitmaps. Why do you think you use the **Icon Editor** to create them?

The only difference between an icon or a pointer and a bitmap is the contents and how these contents are interpreted.

To keep things simple here, you can equate the icon with the mouse pointer. You will see this in many of the PM APIs when you use **WinLoadPointer** to load icons as well as pointers. The only major difference between the two is the internal designations within the bitmap headers. However, we are a wee bit ahead of ourselves here...

The best way to understand the con-

struction is to decompose an icon such as that in Figure 1.

The image shown is 40×40 pixels in 256 colors. The green designates the area of the icon that will assume the background color (the screen color value set within the **OS/2 Icon Editor**). We see this view when we use the **Icon Editor**.

Into the murky depths

An icon is actually composed of three images. Within the icon file, the image is internally comprised of two bitmaps. The first bitmap image contains the AND and XOR mask. The second bitmap image contains the color image.

The actual header for the icon is:

```
BITMAPFILEHEADER2 bfh2:
  BITMAPINFOHEADER2 bfh2.bmp2:
    argbColor[ 2]
BITMAPFILEHEADER2 bfh2:
  BITMAPINFOHEADER2 bfh2.bmp2:
    argbColor[256]
```

It kind of looks like the bitmaps we wrote about in the November/December 1995 issue of *OS/2 Developer*. The only real difference between the two is in the **usType** field.

Remember, the image shown in Figure 1 is only one icon. Therefore, it is not using the array mechanism here, whereas the icon in Figure 2 contains the 40×40 pixel, 256-color image and a 20×20 pixel, 16-color image. The header for it is:

```
BITMAPARRAYFILEHEADER2
  BITMAPFILEHEADER2 bfh2
  BITMAPINFOHEADER2 bmp2
    argbColor[ 2]
  BITMAPFILEHEADER2 bfh2
  BITMAPINFOHEADER2 bmp2
```

```
    argbColor[256]
  BITMAPARRAYFILEHEADER2
  BITMAPFILEHEADER2 bfh2
  BITMAPINFOHEADER2 bmp2:
    argbColor[ 2]
  BITMAPFILEHEADER2 bfh2
  BITMAPINFOHEADER2 bmp2
    argbColor[ 16]
```

The icon in Figure 2 definitely looks like a bitmap array. So much so, it starts out with the bitmap array header, just like a bitmap. So what's the big deal?

Basically, the bitmap array is a container-like animal. It gathers the images together so that when you walk through the header, you can determine exactly what's going on. Whether the icon contains more than one image, the format of the image and the icon header is the same.

As we mentioned earlier, the icon is composed of two images. Looking at the first bitmap header, you will notice two **BITMAPFILEHEADER2** structures. The first structure defines the AND and XOR mask. The second structure defines the image. So what do the actual images look like?

The AND and XOR mask is very simple, but to make things even more confusing, the first image is double the height of the color image. Why? Well,

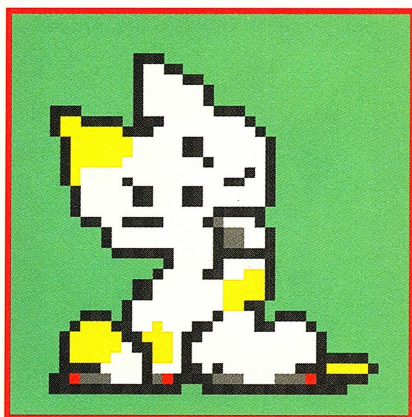


Figure 1: Sample icon.

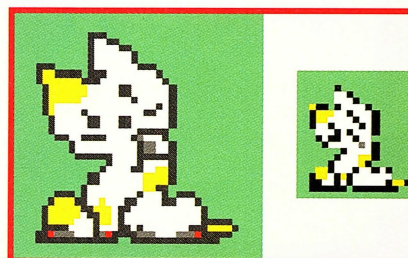


Figure 2: Sample icon with different sizes.

the designers of the OS/2 icons are using a neat trick here to conserve space. The first image is a two-color image (black and white). The AND mask is the lower part of the image, and the XOR mask is the upper part. Figure 3 is the AND and XOR mask for the icon of Figure 1.

We have enclosed the mask in a red border since the AND portion of the mask is clear, or white. The image portion, Figure 4, shows the image, but notice that the area where the background is to appear is black.

You may be wondering what the big deal is about the AND mask if it is essentially clear. Why would it need to be there? Well, let's look at the same icon, but instead of the background color that would be behind the icon being used, let's invert the background. Remember, in the **Icon Editor**, when you are creating an icon, two additional colors are available, **Screen** and **Inverse**.

Therefore, when we change the **Screen** color of Figure 1 to **Inverse**, we get the following image, Figure 5, within the **Icon Editor**.

The AND mask is different this time, as seen in Figure 6. Again, we show it in a red border, so you can see the limits of the mask.

So you see, there is a purpose to the

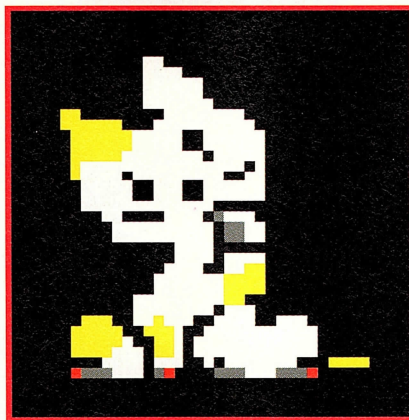


Figure 4: Icon image.

AND mask area. We use it to create the inverted background area of the icon.

The ROP magic act

In the previous issue, we talked about how ROP codes are used. We also talked about the concept of using different ROP codes to complete an image. Icons are a great example of how you would use the various ROP codes.

First, we have three different bitmap images. Each image is going to be drawn using a specific ROP code. The images are also going to be combined with each other through these ROP codes to create the final image.

The three ROP codes in question are: **ROP_SRCAND**, **ROP_SRCPAINT**, and **ROP_SRCINVERT**. It's interesting to see the result of each one as they are drawn. Let's look at how the icon of Figure 1 is drawn in sequence. This sequence can be seen in Figure 7.

The top row is the actual bitmap image of the component parts. The first square is the AND mask, the second square is the image, and the final square is the XOR mask.

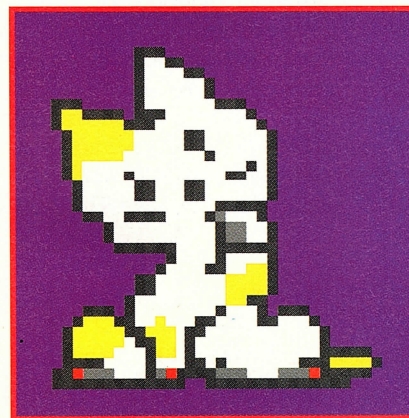


Figure 5: Icon with inverted screen selection.

The drawing of the icon starts in the lower row, first square. The AND mask is drawn using **ROP_SRCAND**. Next, over the resultant image is drawn the **ROP_SRCAND** bitmap. The result is seen in the lower row, middle square. The ROP code used is **ROP_SRCPAINT**.

Finally, the XOR mask is drawn. It's drawn over the results of the first two images. The result is the third square in the lower row. The mask is drawn using **ROP_SRCINVERT**. Because the AND/XOR mask is just one image, a bit of trickery is done.

When you draw the bitmap using **GpiWCBlt**, you have to provide a **POINTL** array that contains the lower/upper corner points of the source bitmap and the target. The trick here is to shift the source corners from say (0,0)-(40,40) to (0,40)-(40,80). If this seems a bit confusing, take a look at the function **CreateImage** in the **GetIco.C** source module of the sample application. Just before we do the last **GpiWCBlt**, we shift the **aptl[2].y** to be the icon height and the **aptl[3].y** to be twice the icon height.

The Icon/Pointer Viewer

You can see all this magic through the **Icon/Pointer Viewer** application we have created. It was based on the

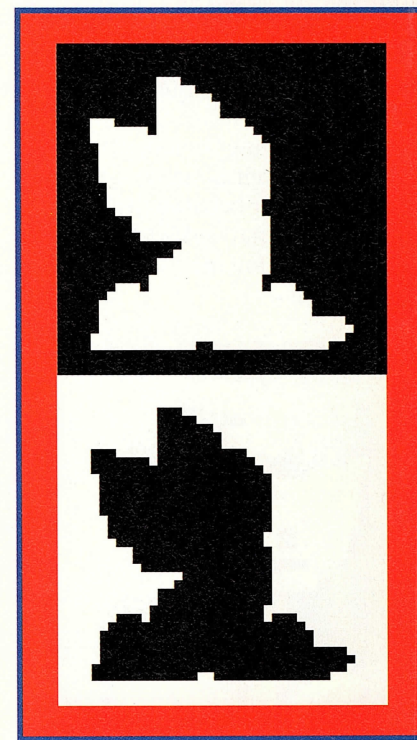


Figure 6: AND and XOR mask showing inverted screen color.

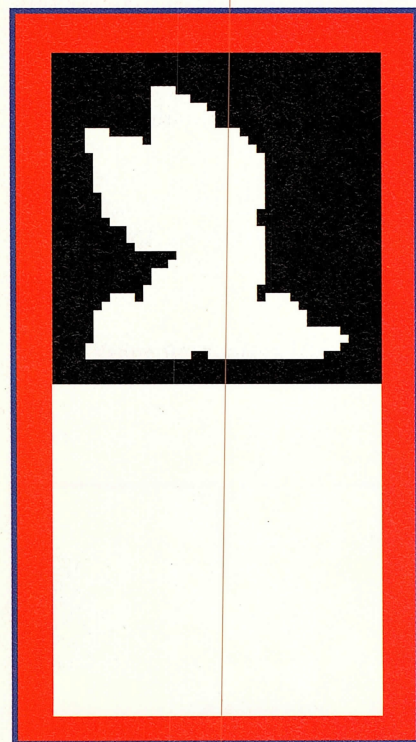


Figure 3: AND and XOR mask images.

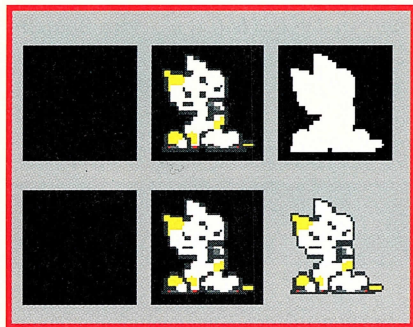


Figure 7: Drawing sequences.

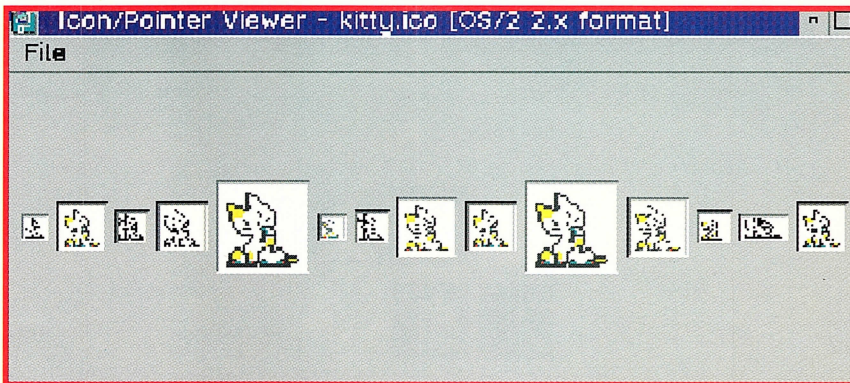


Figure 8: Icon/Pointer Viewer.

Bitmap Viewer that we constructed earlier; but this time it shows just the images of the icons (Figure 8). Each image shown will be one of the different types saved in the bitmap array of the icon or pointer.

When you click the right mouse button over an image, the **View Icon/Pointer Construction** dialogue, shown in Figure 9, will be displayed showing the images that compose the icon. The upper row of images within the dialogue shows the individual bitmap images that are used in each sequence. The lower row shows the images as drawn using the appropriate ROP codes.

We should explain that OS/2 does provide APIs to display the icon or pointer: **WinCreatePointer** and **WinCreatePointerIndirect**. We attempted to use these functions to create our decomposed versions, but each of the APIs will try to adjust the icon or pointer to the size of the system-defined icon or pointer. In other words, when trying to create a copy of a 16X16 icon, the system enlarged it to 32X32 or 40X40, depending on the resolution. It was for this reason we had to create our own routines to cre-

ate the final icon image in the size required.

Next month

Next month, we will explore the wonderful world of pointers, working together to create our own pointers that are larger than the ones used by the system.

Acknowledgements

We would like to extend special thanks to Michael Cooper for providing insight into bitmaps. **OS/2**

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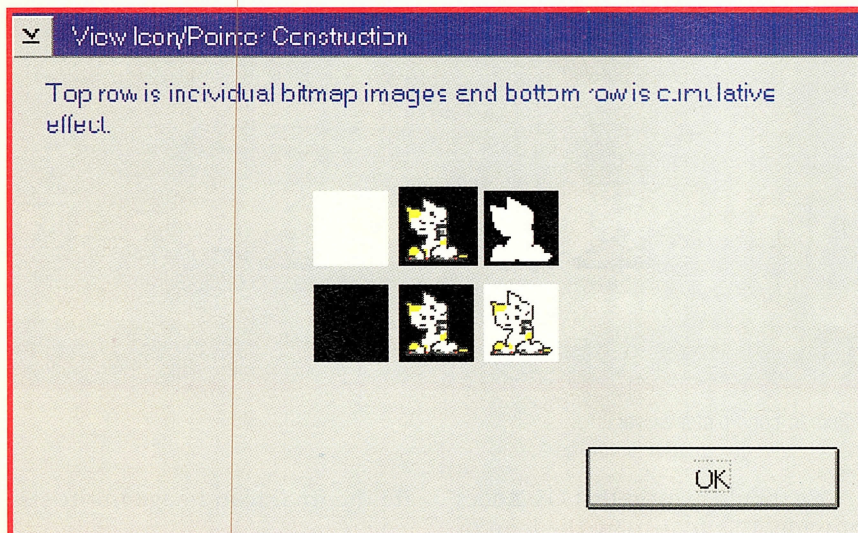


Figure 9: View Icon/pointer Construction dialog box.

Mark Bengel, IBM Software Solutions, RTP, N.C., is a staff programmer who joined IBM in 1989 and has worked on various CUA '91 controls for OS/2 2.x. He works in IBM open class library development, where he develops C++ class libraries for OS/2 and Windows. Mark has a B.S. in computer science from Western Carolina University. He can be reached on CompuServe at

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Matt Smith, Prominare Inc., Toronto, Ont., is lead architect for the Prominare Development System, an OS/2 2.x advanced GUI development environment. Matt has been actively involved with OS/2 since 1988 and cofounded Prom-

inare in 1990. He has a degree in architecture from the University of Waterloo and can be reached on CompuServe at 70363,1175 or via the Internet at msmith@prominare.com.

Resources:

You can download *bmp3.exe* from these electronic sources:

CompuServe's OS2AVEN forum (OS/2 Magazine Section).

File area 11 on the IBM PCC BBS, (919) 517-0001, OS/2 Tools section on the OS/2 BBS for IBM TALKLink customers.

FTP to prominare.com and log in as anonymous. The source is located in the `/pub/prominare/guicorner-codecache` subdirectory.

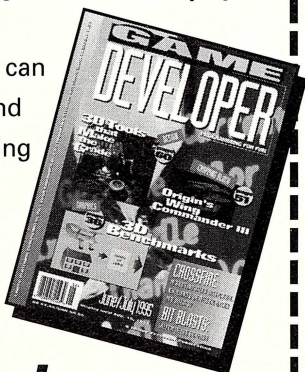
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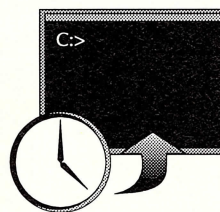
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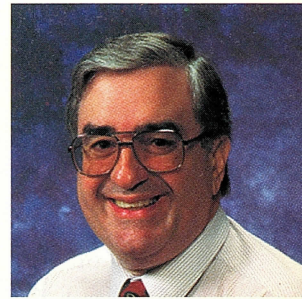
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Product Update

BY GUY SCHARF



At the beginning of the new year, I like to look back over the products reviewed last year. I've had the opportunity to use some of the products again, which allows me to view them in a new perspective. Some products have been updated since the reviews were first published in *OS/2 Developer* magazine and might be new to *OS/2 Magazine* readers. I'll also take a look at the recently released VX-REXX Object Development Kit for OS/2 from Watcom.

Experience rated

The biggest surprise of the year to me has been **Prominare Designer**. With its fine detail orientation and lack of high-level constructs, I had not expected to use it often. However, I turned to it many times in preference to other user interface design tools. I find Prominare Designer to be ideal for extending existing applications and for creating ones that rely on the standard OS/2 controls. It allows me to define every last setting in the resource file. The generated source code serves me as a perfectly adequate skeleton for my application logic. When I am extending an application, I can simply copy the generated resource script to the application's resource file. I have been able to use the source code with only minor editing changes to fit the target application's naming and calling conventions.

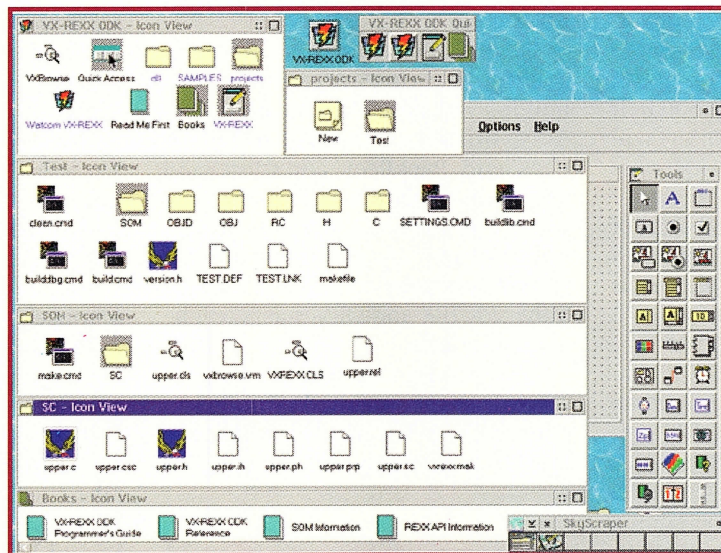


Figure 1: VXODK and folders for project test. VX-REXX toolbar in background shows added custom objects.

My choice of a GUI development tool is always a function of the particular project. If I need higher-level constructs like tables or graphs, I pick the tool that supports them well. My choice of language varies as well. C or C++ is the best choice for some applications, especially when performance or competitive factors are a consideration. Higher-level languages are often better for applications that require speed of development, simplified business logic, or accessibility to the non-programmer. It's a trade-off between speed of development, size of application, and performance. For many typical business applications, language performance is not an issue, while speed of development is more important.

I have grown to like REXX development tools the more I have used them. Performance is more than adequate.

Based on the features I need for many applications, I find myself choosing between Watcom's VX-REXX and Hock-Ware's VisPro/REXX. VX-REXX offers powerful graphing and table tools, along with the best on-line documentation of any product I've used. VisPro/REXX creates a much smaller executable file and is highly integrated with OS/2's Workplace Shell. During this last year, I used VisPro/REXX for writing installation utilities, and it performed admirably, providing me with a compact executable file that would fit on the distribution disk

along with the application to be installed. I used VX-REXX to develop an in-house business application where graphing with drill-down capability was a future requirement. The capabilities of these tools overlap a great deal of the time. Either tool is an excellent choice for many uses.

Since I reviewed **Visual SlickEdit** for OS/2, MicroEdge has released an update that can be used with the IBM Workframe/2 product. My development style has been to use Workframe/2 to build an initial *make* file. I then use VSLICK to maintain the *make* and *dependency* files manually, continue editing the application, and run the *make* file. I find this approach makes the compile-edit-test cycle easy. I edit and build the program from VSLICK. When I'm ready to test, I switch to another virtual screen

(using Binar Graphics' Sky-Scraper) and test.

IBM developer connection

IBM has released the eighth edition of the Developer Connection CD-ROM. As usual for the DevCon, dozens of new and updated demo programs and utilities are included. Many are evaluation or time-limited versions of commercial products. Toolkits, however, are included in their complete versions. Two products stand out in this release: the Japanese version of the OS/2 Developer's Toolkit for OS/2 Warp and an entertainment toolkit. If you need the Japanese Toolkit, you know who you are; I did not examine it closely.

The most interesting new feature of the Developer Connection Volume 8 is a beta release of entertainment tools in the Developer's Toolkit for OS/2 Warp. I found the video samples to be impressively fast, and speed is probably the most asked-for feature by game developers. The full-screen DIVE support allows games to be developed using the 320X200X256 video mode favored for games. While the sample program was fast when run in a window on the PM desktop, it was blindingly fast when the window was switched to a full screen. The beta toolkit also includes Argonaut Technologies Ltd.'s 3D BRender Power Rendering System for OS/2 Warp. I was impressed by the performance and visually effective three-dimensional appearance of the sample program. Besides making it possible to play games effectively on OS/2, these technologies may be useful for demanding real-time displays.

The entertainment tools also include improved MIDI support and a Direct Audio feature for high-performance audio. With

Direct Audio, you can send data directly to the mixer device, bypassing the wave audio device.

Finally, a network facility simplifies communications programming for multiplayer games. Six WarpNetxxxx APIs (**Initialize**, **Open**, **Broadcast**, **PackSend**, **PackRecv**, and **Close**) and a game server allow the programmer to easily communicate with other instances of the application on the network. The beta version supports TCP/IP only; SPX/IPX and OEM stacks will be supported later.

The beta entertainment toolkit gives game developers new opportunities to exploit OS/2. It's major drawback is that it was needed two years ago.

VX-REXX 2.1 Object Development Kit for OS/2

Watcom has released the VX-REXX 2.1 Object Development Kit (VXODK) for

OS/2. With this toolkit, you can build graphical objects that might be distributed and used in VX-REXX applications. The objects are fully integrated into the VX-REXX development environment. You can place your objects and do drag-and-drop programming with them just as with the objects supplied by Watcom. Objects can be distrib-

uted for use in VX-REXX program development and as run-time objects for application distribution.

The VXODK is intended for the professional programmer. You program VX-REXX objects in C, using IBM's System Object Model (SOM) and OS/2 Presentation Manager. While the VXODK hides most of the messy details of SOM, you will be editing the SOM class methods in their C source file. Previous familiarity with C and Presentation Manager is required, and familiarity with SOM and REXX programming interfaces is a plus. This is not the place to learn how to program in C!

The VXODK requires the Watcom C/C++ 10.0 or the IBM C Set++ 2.1 compiler, the IBM OS/2 2.1 Toolkit, and the VX-REXX 2.1. I tested using IBM's C Set++ 2.1 and its OS/2 Warp Toolkit.

Installation

The VXODK is distributed on two disks.

The installation program creates a folder on your desktop with icons for a class browser, a shadow of VX-REXX, a Quick Access utility for launching programs with a single mouse click, as well as documentation and folders.

If your *config.sys* file has long lines, the installation process may fail. Once it fails, you will have to reboot to run the installation program again. Asking it not to modify *config.sys* doesn't bypass this problem. I had to modify my *config.sys* to shorten very long PATH and LIBPATH

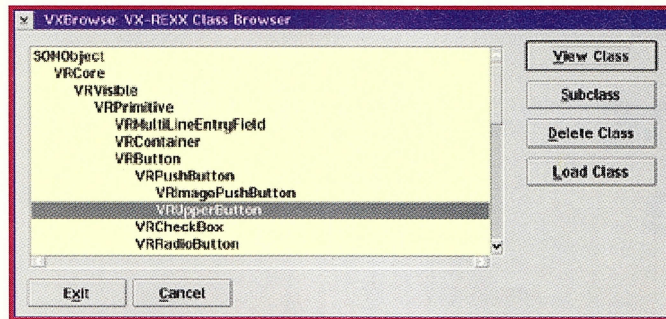


Figure 2: Class browser.

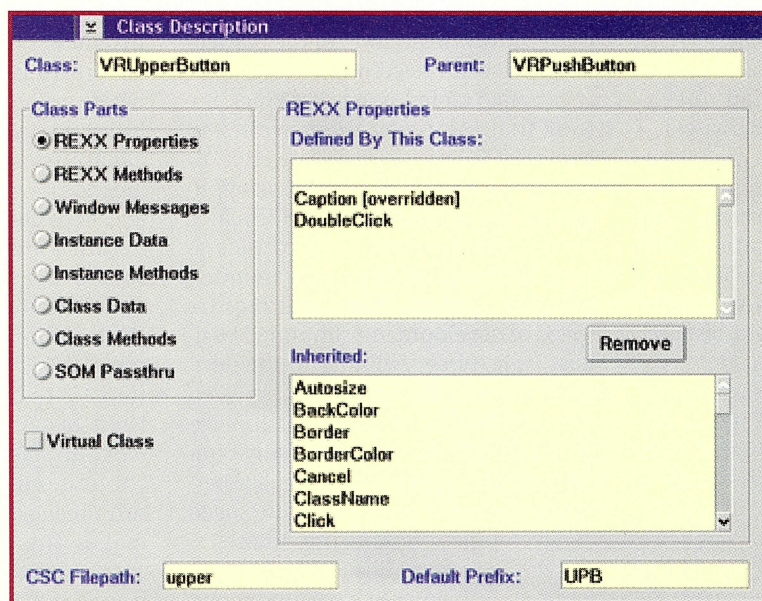


Figure 3: Class description.

statements to complete installation successfully. Then I had to modify the "real" *config.sys* file to include the changes that the installation program could not make to the complete file.

Not all versions of the OS/2 Toolkit have identical file and directory structures. I had to modify the file name in the VXODK's SOM book object for the OS/2 Warp Toolkit.

Documentation

The VXODK includes a 273-page manual. In the usual Watcom fashion, the manual is also online as two *.inf* files—a programming guide and a reference guide. Similar to other VX-REXX manuals, this one covers the product clearly and in detail. It starts with a tutorial that has you creating and testing a new button object in two pages and then continues with extensions to this new object. Later, four sample objects are explored in detail, with common problems identified and their solutions described.

An important section describes the architecture of VX-REXX. You'll need to understand the architecture to implement an object. Nearly two-thirds of the manual is a detailed reference manual for the many functions, methods, and data structures of the VXODK. The descriptions are helpful, and examples are frequently shown.

Ease of use

To create a new object, simply tear a new project off the project template in the **Projects** folder. When you first open the project, a single Click Me object is visible. Double-click on that object, and the VXODK will prompt you for the name of the *.dll* to be created, the compiler to be used, and the VX-REXX and SOM levels to be supported. It then creates the directory tree for the project (Figure 1) and starts the class browser (Figure 2); the Click Me object disappears, having completed its task.

The next step is to add a new class for your object to the VXODK class browser. You will normally select a class and press the **Subclass** button. A small dialog prompts you for the name of the new class, the file name for the SOM class information and C source, and a prefix to be used by VX-REXX when generating default names for objects of this class. Having done

this and exited the browser, click on the **build.cmd** icon and your *.dll* will be built. You'll have to copy the completed *.dll* to a directory in your **LIBPATH**. Next, start VX-REXX and select **Options/Object Libraries...** to add your new object to the **Tools** menu. Having done that, you can now use this object in a VX-REXX application.

Of course, you haven't yet changed the object, so it will act exactly as the object you subclassed. Next, you'll need to extend your class using the class description dialog (Figure 3). You'll be adding REXX properties and methods, handling window messages, and dealing with instance and class data and methods. Adding the definitions is as easy as selecting the right radio button, typing the name in the drop-down list box, and pressing <Enter>. You automatically inherit methods, properties, and so on. You can also hide them, override them, and define new ones. The design of your object is completely up to you. When you close the dialog and exit the browser, the SOM class definitions are updated to reflect the changes you've made.

Now the difficult part begins. VXODK has taken care of the SOM class definitions for you and generated skeleton methods and C code. Icons exist to build your *.dll*. But it's up to you to implement the actual functionality in C using your favorite editor. No drag-and-drop programming or VXODK support, other than good documentation, exists at this level—it's pure C and SOM coding. You're also on your own with IPMD to debug your code. Fortunately, you can develop iteratively, adding functionality in small, debuggable pieces. The VXODK handles the SOM class definition details for you, so you can concentrate on which methods are needed and how they are to be coded.

Summary

If you want to develop your own objects for use with VX-REXX applications, or for resale as add-on products to VX-REXX, the VXODK is the package to use.

Looking forward

I will continue to review operating system application design tools this com-

ing year. As always, I will be concentrating on tools for the professional software developer, typically in the corporate and the ISV market. I'll review at least one test tool and will be looking at products to aid development in teams as well as individually. There are many exciting development tools for OS/2, and I look forward to sharing them with you. **OS/2**

Guy Scharf is president of Software Architects Inc., a software development firm specializing in developing OS/2 Presentation Manager applications for vendors and businesses. He can be reached via e-mail at guy@swarc.com.

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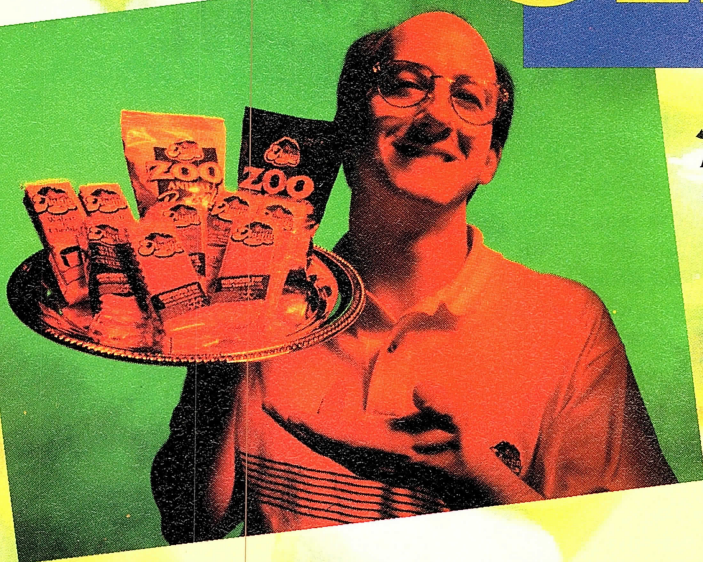
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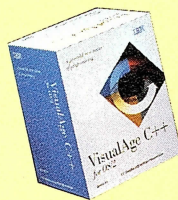
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Online Newspapers and the IBM PC

XTRA XTRA 1.0B and the IBM PC 350-P90. BY BRIAN PROFFIT

Xtra Xtra 1.0B

Our society has brought us to the verge of information overload. With so many sources available, it's no longer possible for us to keep up with every factoid that is available from radio, television, and online services. The demands on our time have become so severe that most people read only selected parts of their daily newspaper, and some no longer even bother with that. We develop tunnel vision, focusing only on specific areas of interest while filtering out extraneous information. However, even that sifting process takes time. Now, imagine all the items that fit your interest pulled together into a personalized newspaper. Sublime Software's Xtra Xtra works with CompuServe to do exactly that.

A newspaper just for you

Xtra Xtra presents information in a Workplace Shell notebook, divided into separate sections the same as a newspaper (Figure 1). The tabs for front page, news, sports, weather, quotes, and ads let you move quickly to your area of interest. The pages are filled through calls to CompuServe in which Xtra Xtra scans the Associated Press On-line, National Weather Service, Stock Quotes, and Classified Ads sections of CompuServe.

The news section is further subdivided into national, Washington, world, political, entertainment, business, features, and science and health news. The sports section is subdivided into baseball, football, basketball, hockey, soccer, college, tennis/golf, and Olympic and other sports news. The classified ads are divided into dozens of sections, just as in your home newspa-

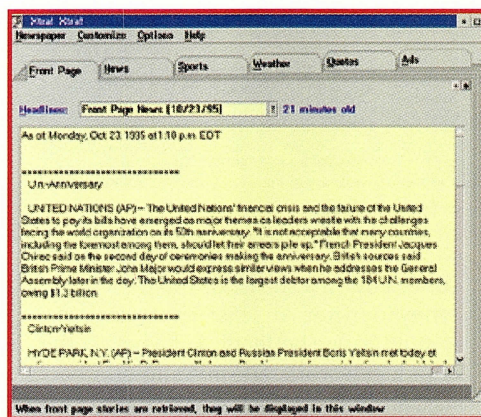


Figure 1: XtraXtra provides a customized newspaper.

per. Xtra Xtra also gives you access to CompuServe's E-Span, a national job search classified section.

You customize the newspaper by identifying the specific sections and subsections of interest. Within each topic, you can list keywords that identify specific points of interest to you. Within football, for example, if you're like me you will surely want to list **Dallas** or **Cowboys** as keywords. By default, keywords are assumed to be connected by an **or**, meaning that the presence of any of the keywords constitutes a match. Those in the New York area, though, may want to take advantage of the ability to specify **New York** and **Jets** to avoid accidentally downloading stories regarding the Giants. You can also use an asterisk in keywords as a wildcard. If you type in ***sail***, your search will yield subjects as varied as, Connor Describes New Sail, Sailing to Bermuda, and Secrets of Great Mainsails.

Don't specify **O.J.** as a News keyword, unless you have a large hard disk to hold all the stories. Fortunately, you

can only choose to download the first few stories that match the keyword by specifying a number from 1 to 10.

To keep up with your stocks, specify the ticker symbol and name of each stock you want to keep up with, within quotes. If you choose to also enter the number of shares you are holding, that will be multiplied by the current price showing the current value of your holdings each time a quote is retrieved.

Making the call

When you select Get Newspaper, Xtra Xtra automatically calls CompuServe, supplies your user ID and password, and navigates through the desired areas retrieving the information specified. If a headline contains one of the keywords specified for that section, the accompanying story is downloaded. Xtra Xtra takes advantage of OS/2 multitasking to make the information for each section available as soon as its download is complete. This function allows you to begin browsing the Front Page, for example, while the program is continuing to download sports in the background. When all downloads are complete, the connection with CompuServe is dropped, and you can review the stories at your leisure. You can also have your newspaper automatically printed at the end of each run. In fact, you can set up Xtra Xtra to call CompuServe at regular intervals and update the displayed information or print a new newspaper automatically.

While only those stories that match your keywords are downloaded, all of the headlines found in the sections you select are downloaded. You can then browse them and mark any that look

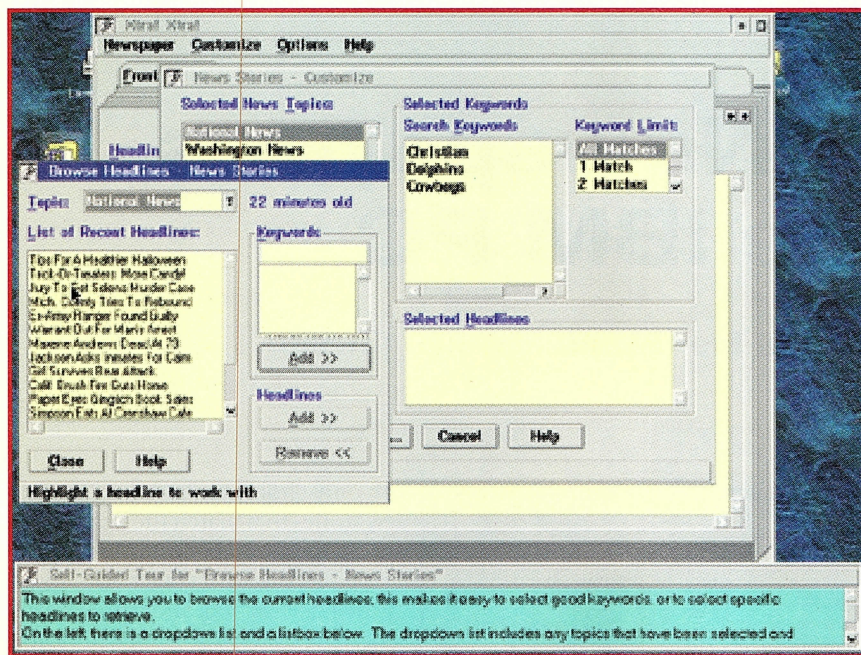


Figure 2: You can browse headlines and select stories for download.

like they would be interesting (Figure 2). If any of these stories look like topics of continuing interest, Xtra Xtra makes it easy to transfer that headline's keywords to your regular list. You can then have the program make another call to CompuServe, this time downloading the stories whose headlines you have marked, and append those stories to the ones first downloaded.

As you're browsing stories, clicking the right mouse button brings up a menu that lets you print the story you're reading, print all marked stories, or print the complete newspaper. If you highlight a word before pressing the right mouse button, the pop-up menu allows you to add that word to your keywords list.

Shareware, sort of

Classified as shareware, Xtra Xtra ships as a DOS self-extracting file. So if you didn't install DOS support, you're out of luck. And while this program is classified as shareware, the program you download lets you see the user interface and look at the help panels, but little else. It can't connect to CompuServe, so you have no way to see the process or how the final stories appear. That doesn't give you much of a chance to evaluate the product. I'd rather see them ship it with the ability to connect and download stories, but perhaps only

once and in a subset of the topics that they define. At least that way you would have a better idea of whether the product is worth the investment.

On the other hand, when you first load the program, a startup panel from the online help loads automatically. This action is especially nice because, being shareware, no printed documentation is available—it gets you going quickly. I also appreciate the Tip of the

Day, a small window that pops up when you first load the program with a helpful tip on getting the most out of the program. (It can be disabled after you've become familiar with the program.)

Xtra Xtra includes a Quick Tour option, which displays a long window across the bottom of the screen with help information applicable to whatever part of the program you are currently using. Unfortunately, some problems occur with this feature. I encountered several unusual bugs and quirks in Xtra Xtra until I turned this feature off. On the other hand, Sublime made it easy to report problems. The program has the built-in ability to create feedback. This feedback is then sent to Sublime the next time you search for news.

Glee or flee

Having a newspaper tailored to an individual's interests flatters our desire to be unique. On a more practical level, it saves time. You may find that a few minutes with Xtra Xtra can replace an hour watching televised international news that covers many things of marginal interest at best. Only you can determine what your personal time is worth, but time spent online, slowly browsing the news services, costs real money. Just as you save online dollars by using a program like Golden Compass to access forums and libraries, Xtra Xtra can save you money when accessing the news areas. Not that it runs quickly—AP On-line is a very slow service no client-side software can speed up. It does, however, run happily in the background so you don't have to wait for things to happen or spend online time deciding what stories to read. On the other hand, a newspaper should have comics.

IBM PC 350-P90

The standard office desktop entry in the IBM line, the PC 350, is available preloaded with OS/2 Warp for Windows (red-spine version). The hard disk is configured for dual boot between OS/2 Warp and PC DOS 6.3 with Windows 3.11. OS/2 Warp is at the base level, with no FixPaks installed. If you want to install a FixPak, you should know that IBM inexplicably left the OS/2 *syslevel* information in an incorrect state. *syslevel* reports that the current level is OS/2

System Test Drives

A common question surrounding OS/2 Warp is its compatibility with various hardware configurations. Because our focus is OS/2, we aren't planning to do exhaustive hardware testing. On the other hand, knowing what systems appear to install and run OS/2 Warp successfully can help OS/2 users make buying decisions.

We will be selecting a variety of computer systems, some that offer OS/2 Warp preloaded and some that don't, and reporting on the system's compatibility with OS/2. We'll take particular notice of systems for which device drivers aren't included with OS/2 Warp, whether the required device drivers are available and where those device drivers can be obtained.

Test Drives

2.11. This anomaly often happens when video device drivers improperly change the system level during installation. You will have to copy the correct *syslevel.os2* file from the installation disks before you can install a FixPak. IBM should know better.

Because no disks come with this system, one of the icons on the desktop is the OS/2 Diskette Factory. This entry allows you to create installation disks for each of these bundled software products: OS/2 Warp for Windows with BonusPak, CoSession LAN for Windows, IBM AntiVirus/2

for OS/2, IBM Easy Tools for OS/2, IBM NetFinity Services for OS/2, IBM PC QAPLus/Pro and QAPLus/Win, IBM PC DOS 6.3, IBM PC Tools, IPF Reader for Windows, MS Video for Windows, MS Windows 3.11, Sedona Reprint for Windows, and S3 Trio64 video drivers for DOS, Windows, and OS/2. In short, this package has a lot of bundled software and disk images. In fact, the 540MB disk only has about 200MB free. It's easy, though, to remove any items that you don't want and free up that space.

The hard disk is configured with a single FAT partition, containing both DOS/Windows and OS/2 setup for dual boot. Interestingly enough, if you boot to DOS/Windows, an OS/2 Warp group on the Program Manager desktop exists that contains an entry to delete OS/2 Warp. However, a corresponding option on the Workplace Shell desktop to remove DOS/Windows does not exist.

When you first start the system, OS/2 Warp boots and displays the tutorial—a good place to start. When you close the tutorial, you see the desktop with the Easy Tools for OS/2 Warp window open (Figure 3). As you can see, the components of the Warp BonusPak, IBMWorks, CompuServe Information Manager, Internet Access Kit, and Person to Person/2 are installed.

The display is initially set for a resolution of 640×480, with 64K colors. Because of the amount of video memory included, you must drop down to 256

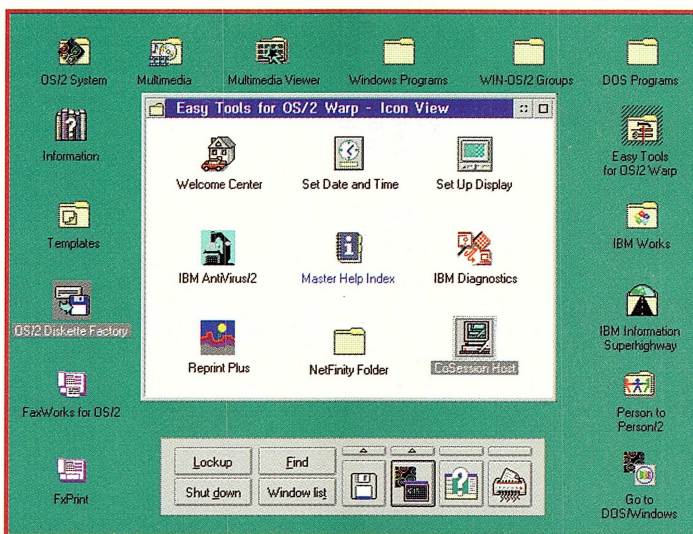


Figure 3: The PC 350's initial OS/2 Warp configuration.

colors to move to higher resolutions. Since no sound card, CD-ROM drive, network card, or modem is standard equipment on this configuration, these features weren't tested with O/S2 Warp.

Because the hard disk contains only a single FAT partition, I was surprised to see that the *config.sys* file was wasting resources by loading the HPFS device driver. Nevertheless, O/S2 Warp and all installed components worked without problem on this system. If you don't get the system with O/S2 Warp preloaded, you'll have to acquire the S3 Trio64 device driver separately to run OS/2, because it isn't included in shrink-wrapped versions of O/S2 Warp. The file *s3-764.zip* is available from the S3 BBS (408-654-5676) or CompuServe (OS2USER's OS/2 & Hardware library). My apologies to those who prefer the Internet. I complained a couple of times to S3 that the driver wasn't available from *ftp.s3.com* so they shut it down to anonymous access. I was able to install O/S2 Warp FullPak successfully on the PC 350 in VGA mode and then

installed the separate S3 device driver without problem.

System Configuration

Testing was conducted on an IBM PC 350-P90, which by default contains a Pentium 90MHz processor, 256KB cache, 8MB RAM (upgradeable to 128MB), and a Western Digital Caviar 540MB IDE hard disk. The system has three ISA slots and two shared ISA/PCI slots. The S3 Trio64 video support is embedded on the motherboard and doesn't use a PCI slot. There is 1MB video

memory embedded, with sockets for an additional 1MB video memory. A 3½-inch floppy disk drive is included, with bays for an additional hard disk and two other 5¼- or 3½-inch devices. **OS/2**

Brian Proffitt was part of IBM's OS/2 team and left IBM to become the director of PC Week's Corporate Labs. He is now the president of Visionary Research, senior contributing editor for OS/2 Magazine, and solutions advisor to PC Magazine. E-mail him at 75300.1466@compuserve.com.

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OS/2 preload available:	Yes
Video driver:	Separately available
Sound driver:	N/A
CD-ROM driver:	N/A
Network driver:	N/A
SCSI driver:	N/A

Making Cents: Three Personal Accounting Applications

Check Plus, In Charge, and Electronic Teller. **BY ESTHER SCHINDLER**

Like programmer's editors, personal finance programs are a category that inspire religious zealotry from their users. As a result, even though dozens of DOS and Windows personal accounting applications are available, only a handful dominate the field. OS/2 users, conversely, only have three choices if they want a native OS/2 program: Spitfire Software's In Charge, Paul Caron's Electronic Teller, and Computer Interface Corp.'s Check Plus. How much of a compromise is this? Let's take a look.

In Charge is marketed as a financial management system and offers general accounting features for personal as well as small-business use. It supports multiple currencies, full-query capabilities, and securities portfolio management. It also includes small-business functions such as invoicing. A scaled-down version of In Charge is included in the IBM Family FunPak.

Check Plus's description is more modest: "Check-writing software for OS/2." It doesn't promise the full portfolio, insurance, and home-inventory management that In Charge does, but it does claim to be suitable for small businesses.

Electronic Teller goes even further and doesn't promise to be anything more than a home-accounting system.

Getting started

Ordinarily, when I install software, I grab the disks and dive right in. (I jus-

tify this by reminding myself that everyone else does the same thing.) With accounting software, however, it's a good idea to know where to go, so I started out by reading the manual.

With In Charge, I was a little sorry I did. As a new user, I'm interested in the process. (What do I do to get started? Then what do I do?) In Charge's manual is thorough but disorganized. It's written as if the programmer sorted through the functions of various code modules, instead of thinking about users' questions. For instance, I didn't want to know about fonts or search masks in the first chapter; I wanted to know how to input my data and start writing checks. In Charge is updated very often, so

you'll refer to its online documentation for the most recent instructions. The online help offers more examples than the printed manual, but it's still far from smooth.

Check Plus's manual was much better. It gave me a clear picture of where I was and where I needed to go. I would improve its grade from a "B" to an "A-" if only it included more screen shots, a step-by-step tutorial, and a bit more of a hand-holding approach (for example, "John and Mindy want to start an investment account..."), but I could figure out what to do.

Electronic Teller has no printed documentation. All of the instructions are included in the program's

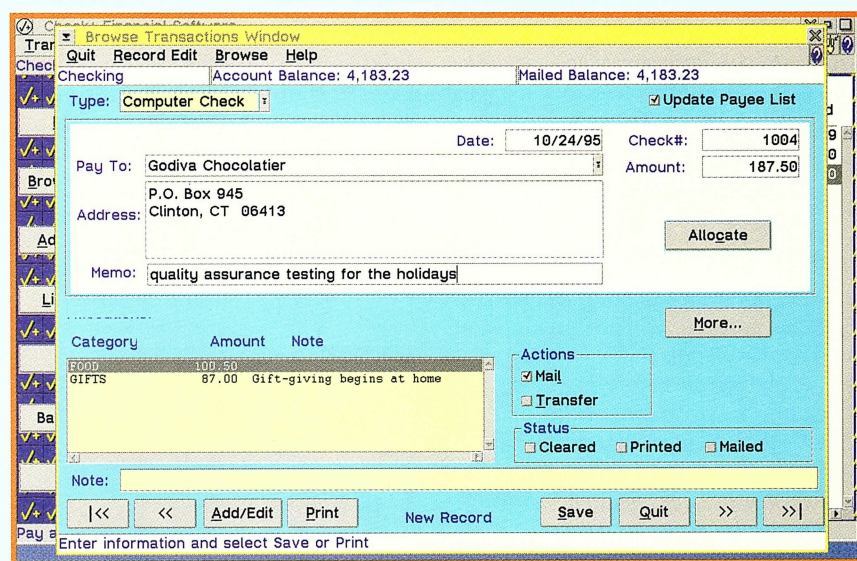


Figure 1: Check Plus shows budget allocations on the same page as the check you're writing and permits you to browse through transactions without navigating another menu.

help files, but its quality is good. It includes a tutorial that a financial novice would understand, and the online documentation is clear and easy to follow.

Installing the software was unremarkable. Only Check Plus supplies a starter set of business and personal budget categories. In Charge, however, does include a long list of U.S. tax categories.

Basic checkbook management

All three packages import data from Quicken, the market's leading personal finance manager from Intuit. In Charge also imports from PF2 (Spitfire's DOS product) comma-separated ASCII files, Checkfree (an online check-writing service), and credit-card files. The procedure was a bit rough for all of these, but presumably it's something you'll need to do only once. I encountered an obscure bug when I imported my Quicken data into Electronic Teller. In Charge did an impressive job figuring out the appropriate tax codes for each of my budget categories, once I fiddled with Quicken's export settings. When I imported data into Check Plus, the import took over my system; I couldn't do any other work for several minutes, while Check Plus chomped on four years of data.

To create a new check or deposit, you enter a check payee and amount; optionally, you can assign all or part of that amount to budget categories (for example, groceries) and tax-related categories (such as W2 salary). You can transfer money from one account to another, similar to writing a check to pay your Visa bill. All three programs handle these simple transactions well.

When you deposit a payroll check, you typically want to track how much of your gross pay was withheld for income tax and

other deductions. These complex transactions are the first you'd choose when you decide to automate your bookkeeping (so that you process your payroll deposit on the 1st and 15th of every month), but they aren't always easy to set up. To create a split transaction with In Charge, you have to open several dialog boxes and do a lot of clicking. I found the process extremely awkward. Check Plus shows the split allocations in a single window, which (if you squint your eyes just-so) looks something like a check. Electronic Teller does the best job of the three. I found its method of splitting transactions quite easy to understand, since it uses the expected OS/2 notebook paradigm. All three programs can memorize transactions, so you don't have to retype the full name for checks you often write.

All these programs support recurring transactions, such as paying the rent by the first of the month. Electronic Teller includes a reminder calendar (as well as a calculator), but it isn't directly tied into a given transaction. It took me a few minutes to learn how to set up a recorded procedure in Check Plus, but once I got the hang of it, it became a straightforward process. Check Plus reminds you about recurring bills that are due, changing

the color of the item as you get closer to the due date—I really liked that feature. With In Charge, you can include more than one transaction in a batch, but In Charge assigns a new check number to each. For example, since my Visa card and car loan are with the same bank, I ordinarily write one check to cover both. In Charge's batch insists on writing two checks (though I could create a workaround by using a withdrawal rather than a check for the second payment).

All three programs can print checks and give you the power to customize check formats. Check Plus provides a few more predefined formats than do the others.

In Charge and Check Plus support budgeting, an area that Electronic Teller doesn't begin to address. In Charge really shines when it comes to budgeting. You can establish budget amounts in several ways: type in amounts month-by-month, split a given amount equally across the year, or adjust the budget amount based on a percentage of actual or previous budget settings. Moreover, the budget screen lets you project expenses on the spot, so you can instantly see if you're likely to exceed the amount you planned.

Making Cents, *cont'd on p. 67*

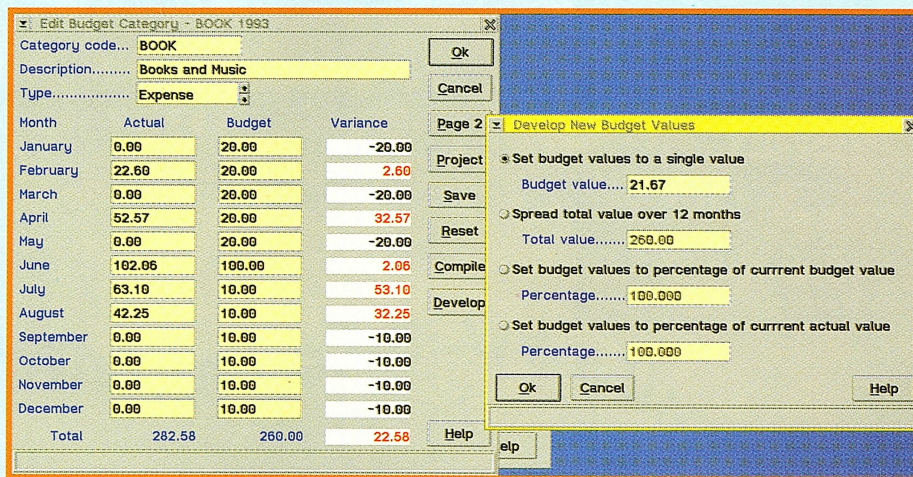


Figure 2: In Charge's budget management gives you useful and immediate feedback on how you're doing, with an impressive degree of control. It also lets you project your financial planning into the future.

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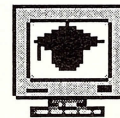


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Making Cents, cont'd from p. 62

Check Plus gives you a blank field to fill in for the monthly budget, and it can create a report to tell you how well you're faring. Check Plus is a little better than In Charge at managing budget categories. If a category becomes inactive, it's easy to temporarily turn it off. You can also merge all transactions from one budget category into another, which is a welcome feature.

Reconciling accounts works approximately the same way in every package: you click on the cleared transaction, and the program keeps a running total. Check Plus provided the best status reporting while I went through my bank statement.

Reporting

You view In Charge's reports on-screen before you send them to the printer. While you can select different fonts to use for reports and checks, In Charge recommends that you choose a mono-spaced font, or the numbers will not line up. This limitation irks me; if I want to print my check register in Olde English, the program ought to handle lining up the numbers. The number of reports with In Charge is respectable, and the formatting is sufficient, if plain. In Charge makes it easy to save the report to a file, so if you want to spruce up your income statement you can import the file into your favorite word processor.

Check Plus's reports are prettier, but there's no easy way to preview

them. In many cases, I want to examine a report (say, to see how much money I've spent on groceries this year) but I don't really need to see the data on paper.

Electronic Teller's reports are sparse, and only a few are predefined. However, the program gives you the power to create more. You can select fonts, but Electronic Teller only shows you the mono-spaced ones.

Beyond checkbooks

Check Plus is advertised as check-writing software, so it's no surprise that it's light on features that exceed this goal. Nevertheless, you can customize reports and manage assets and liabilities. You can create loans (as borrower or lender) and manage investments, though with skimpy tracking information. You'll have enough asset and liability information to keep your net worth statement accurate, but Check Plus clearly isn't intended for the active stock market investor.

Electronic Teller's asset and liability management is thin; you'll be able to record the value of your house and

car as well as enter transactions that look very much like checks, but don't expect much more than that.

In Charge's capabilities beyond checking are impressive. It records and manages assets, securities, and insurance policies, and it offers a lot of feature depth with these capabilities. It supports several kinds of accounts, well beyond the predictable checking account and credit cards. It handles up to 11 currencies, and it uses the exchange rates you provide to convert amounts automatically. This is an unusual feature for any accounting program, and one that is quite welcome. It can import stock information that you download from CompuServe or Prodigy. It maintains a significant amount of tax information and creates several reports that would be great to have at tax time. In Charge also provides features to support small businesses, such as credit-card processing and managing invoices. In Charge recently added Check-free support, though I didn't test it.

In Charge supports multiple sets of books, so you can use the program to maintain both personal and small-business records. It's possible to use Check Plus for both personal and business purposes, but you would need to manually retrieve the other set of books from the installation disks and create another program object that would use a different default directory. Electronic Teller supports multiple sets of books, but only one can be open at a time.

Electronic Teller provides graphic reports and tools, displaying categories and accounts with bar

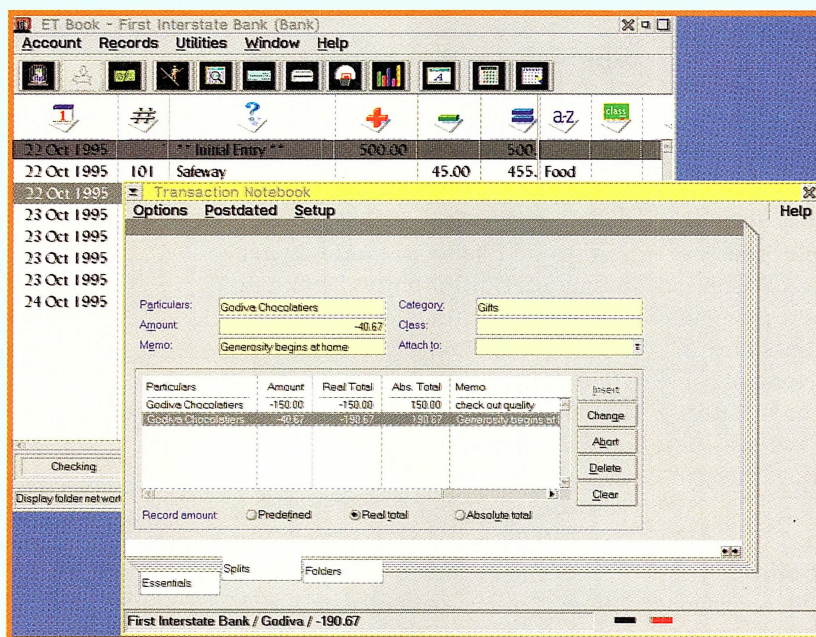


Figure 3: Electronic Teller's method of splitting transactions is clear-cut, since it uses standard OS/2 notebooks.

Review

graphs and pie charts. You can't copy the graph to the clipboard, however, much less print it as part of a larger report.

User interface

Accounting software is the premiere example of the difference between "easy to learn" and "easy to use." One regrettable side-effect of reviewing software is an unnatural concentration on the former; in the real world, people learn the package once, but they use it for years. (Magazine editors don't give us reviewers that leisure.) To form a real-world opinion, I used In Charge and Check Plus (as well as my trusty old DOS Quicken) for a few weeks, and Electronic Teller for a somewhat shorter period. While I did so, I paid attention to such things as the length of time it took me to enter simple transactions and the usefulness of the reports generated.

Entering my ordinary transactions was fastest in Electronic Teller, though Check Plus was almost as straightforward. I liked the way Check Plus let me browse through transactions to review or edit them. But when a process takes a while, Check Plus provides no sense of progress, not even a "records processed" update. Electronic Teller's pretty interface was more than skin deep; features tended to be where I looked for them first, and I rarely had to click on **help**. However, Electronic Teller was the least robust of the three packages. While it never lost data, the program crashed on me several times during my evaluation period. None of the three, alas, lived up to the intuitive simplicity of Quicken's interface—or am I simply used to the way Quicken does things?

How do these programs score on the OS/2-o-meter? Electronic Teller does the best. It's an excellent example of Workplace Shell programming, and it follows all the OS/2 rules. Right-clicking gives you a menu;

transactions are organized in notebooks. I felt immediately comfortable using Electronic Teller, and I suspect that you will, too.

Check Plus uses the right mouse button intelligently, but it's not very good at threading. There's nothing to complain about in regard to its OS/2-ness, but nothing to crow about either.

In Charge multithreads quite well, but you'll see little else that reminds you that you're using OS/2. In fact, In Charge follows few of the OS/2 user interface guidelines. Unfortunately, Spitfire didn't replace them with something better. In Charge's biggest problem is in its user interface, which needs serious work. Using the program is annoying and frustrating. The dialogs are inconsistent. Some have a **done** box; others require that you click **cancel** when you really mean **ok**. A notebook metaphor would work much better than the current cluttered look. It's a crying shame, too, since the company's tech support is superb, the product is updated and improved often, and the guts of In Charge are nothing short of awesome.

Voting with your checkbook

In Charge's feature set is substantial and well-designed. If you can get past its learning curve and you need serious budgeting or investment features, you might want to consider it now.

I would like to give a hearty recommendation to both Check Plus and Electronic Teller, but something holds me back from enthusiasm. I like them both very much; I just don't love them. Either would both be suitable if your financial needs are uncomplicated. I lean slightly towards Electronic Teller because I prefer its user interface, but "pretty" is in the eyes of the beholder; examine both before you make a choice. A limited version of Electronic Teller is available as shareware, so it's easy to make your own evaluation.

I wish I could pick and choose between features of all three of these accounting programs, because I like some features in each, and am dissatisfied with others. Should you give up the DOS or Windows application that you have been using for years? I wish the answer was a resounding Yes...but I can't recommend that course unless you're a diehard OS/2 applications supporter. Also, a few more OS/2 personal accounting packages are on the near horizon. If you have an existing DOS or Windows accounting application with which you're extremely comfortable, stick with it...for now. **OS/2**

Esther Schindler is a computer consultant and writer. She is a senior contributing editor to OS/2 Magazine, the sysop of the Ziffnet Executives On-line Forum on CompuServe, and co-author of Teach Yourself REXX in 21 Days, from Sams Publishing. You can contact her at 72241.1417@compuserve.com.

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Enhancing the Workplace Shell

Object Desktop. BY CHRISTINE WHITE

Object Desktop is the latest entry from the OS/2 experts at Stardock System. The company's other programs, OS/2 Essentials and Galactic Civilizations, are both written for OS/2 and have garnered the company a large following of OS/2 users.

With Object Desktop, users of OS/2 Warp and OS/2 2.1 are able to give their desktops an updated look and feel. Enhancements to standard folders and data files make finding information a snap. A collection of desktop navigation features—Tab LaunchPad, Keyboard LaunchPad, Control Center, Task Manager, and Object Navigator—make it easier to zip around the Workplace Shell. Stardock also includes an SDS Extras disk filled with icons and background bitmaps.

Installing Object Desktop

I began by installing Object Desktop on several IBM ThinkPads. The machine I used for most of the review was a ThinkPad 750C with 20MB of RAM. Other computers I used were a ThinkPad 755CE with 8MB of RAM and a ThinkPad 755CD with 40MB of RAM. All were running OS/2 Warp Connect on HPFS partitions.

The graphical installation routine earned bonus points from me. First, it ran

quietly in the background while I was using Golden Compass to download and read my e-mail. Second, it correctly defaulted to my E: partition where I keep most of my applications; it also found the *config.sys* on the D: partition without asking. Third, it used the UNPACK that came with OS/2 instead of cluttering my hard drive with yet another version of UNZIP.

I installed all the features of Object Desktop and elected to use the new Tab LaunchPad and Control Center immediately. Object Desktop placed shadows of those two items in my **Startup** folder. The Installation program told me that after a shutdown and reboot, I was ready to go.

The installation for SDS Extras, however, owes me points. It uses a character-based interface that requires you to type "enter" instead of pressing the

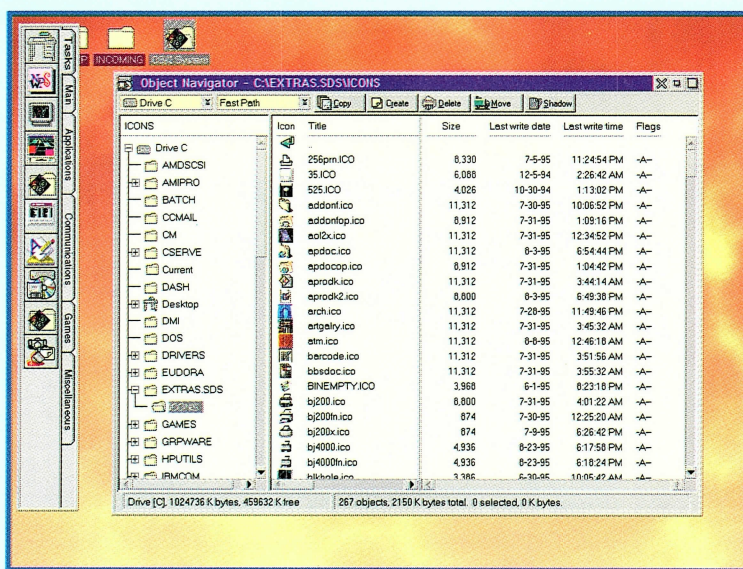
<Enter> key. It identified nothing correctly and even reported installation errors when I typed my preferred partition with a lower-case letter instead of upper case. After two attempts, I correctly installed the icons, bitmaps, and compression utilities.

LaunchPads

Object Desktop adds a few new programs, like the Tab LaunchPad and Keyboard LaunchPad. It also uses programs that are already a part of OS/2: the Workplace Shell and Task List. With the latter, Object Desktop simply enhances the appearance and function of the program without actually changing it. This is the way the objects are designed to work. It makes programs smaller and quicker to work with, and makes it easier to choose only the features that you want to use.

Upon rebooting after the installation, the desktop takes a few moments longer to rebuild. This happens only when you change the objects of the Workplace Shell. Successive restarts take no longer than they did before Object Desktop.

However, I encountered a slight problem. I chose to use the new Tab LaunchPad but did not disable the OS/2 LaunchPad. The computers I used did not like having both programs running and immediately locked up the desktop, requiring a Ctrl+Alt+Del to reset the sys-



tem. I fixed the problem by being quick enough to close the LaunchPad before the Tab LaunchPad appeared. This happened only the first time I restarted after installing Object Desktops. After that, both the LaunchPad and Tab LaunchPad started nicely.

The Tab LaunchPad is an area from which you can quickly launch applications, tasks, or documents. It's a set of configurable tabs, similar to tabs in the Settings notebook. Object Desktop creates tabs for Main, Applications, Communications, Games, and Miscellaneous. These are easily changed, removed, and added to from the Tab LaunchPad's Settings notebook. In addition, you can create multiple Tab LaunchPads.

The Tab LaunchPad's interface is a nice step forward from the LaunchPad. Using the tab dividers, it's easier to remember what is on the page, opposed to what is hiding in the LaunchPad's drawer. The Tab LaunchPad also has more options for configuring. For example, you can choose mouse clicks to be **Normal** (start the application when you release the first mouse click), **Hot** (start the application when you click), or **Cold** (double-click).

You can also choose a "hot spot" for the Tab LaunchPad and, another Object Desktop program, the Control Center. On the test machines, running the mouse over the bottom right corner brings the two programs to the foreground. I found this to be both handy and annoying. Handy, when I want the Tab LaunchPad while in another application, and annoying, when I was trying to scroll in DeScribe and the Tab LaunchPad would appear.

The other task-launching program is the Key-

board LaunchPad. Long needed in OS/2, this program allows you to start applications and tasks from the keyboard. The setup for the program is nifty. Open the Keyboard LaunchPad and drag an object into the window, then choose keystrokes to start the task. Within minutes, I had created keyboard shortcuts for dozens of applications and documents.

I quickly learned to avoid using the Alt key, though. The Alt key plays an important role in most applications, and Keyboard LaunchPad overrides shortcuts used in applications. For example, I assigned <Alt+F> to start one of my DOS applications. In DeScribe, I pressed <Alt+F>, then "S" to save the document. The key combination didn't save my document; it started the DOS application and passed it the "S".

After remapping the hot keys, I quickly learned to love starting applications and opening documents with a keystroke while in the middle of something else.

Navigating with Control Center and Task Manager

Control Center is the most noticeable

portion of Object Desktop. Using about an eighth of the screen, Control Center allows you to see what's happening with your computer, access folders and devices, and move from one virtual desktop to another.

Control Center shows you graphically the amount of disk space used and remaining on your fixed disks. You can optionally add any network drives you want to see. Above this area, a monitor shows the size of your swap file and your RAM usage. An active graph in the center of the Control Center displays CPU utilization in real time. I found it interesting to watch how both CPU and Memory changed as I used various Windows and OS/2 applications.

OS/2 system-level folders—**OS/2 System**, **System Setup**, **Drives**, **Command Prompts**, **Information**—are shadows on the Control Center. Similar in appearance to Windows 95's **Start** menu, the Control Center's folders allow you to open those items that you use fairly often but have buried several folders deep on your desktop.

The most noteworthy feature of the Control Center is the Virtual Desktop.

Virtual Desktop gives you *clean* areas for your serious multitasking. For example, you're working on a word processor and have a few folders open with various documents and graphics. You decide to shadow a few documents to the desktop but don't want to minimize and rearrange all the folders to do it. Click the second desktop from the Control Center and, presto, a nice clean desktop with which to work appears. Then click to desktop number three and open all the folders for LAN Server 4.0 administration. Now

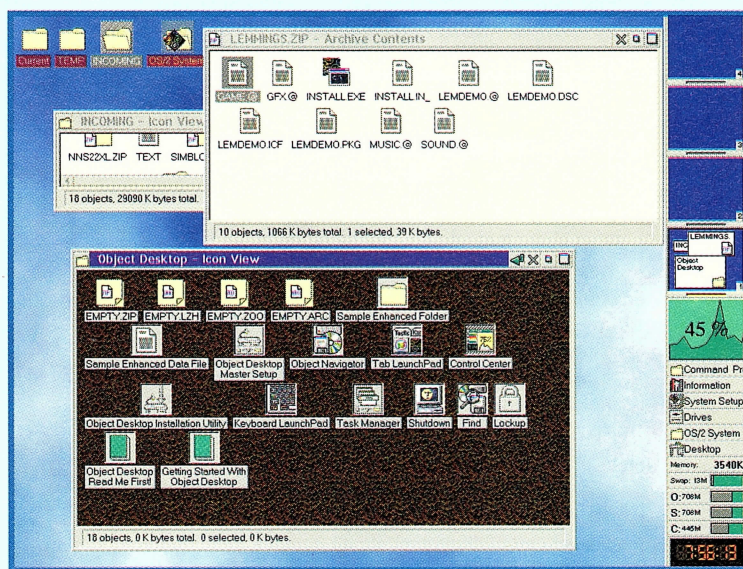


Figure 2: The Control Center offers virtual desktops and some launch pad capabilities, while the Object Archive feature allows you to view archives like Workplace Shell folders. (The Lemmings.zip folder is actually an archive.)

you've got three desktops arranged just as you'd like. As a bonus, shutting down and restarting the system will put all the virtual desktops back the way you left them!

The default is four virtual desktops, but you can have as many as 16. You can configure the desktops to warn you of, or prevent you from, moving windows off the active desktop. This warning is a real boon to new users who move a window so far down that they can't figure out how to get it back. Another option is to lock certain applications and windows, such as the Tab LaunchPad, so that they appear on every virtual desktop.

Task Manager

The Task Manager is one of Object Desktop's enhancements; it's the Stephen Seagal version of the Window List—pumped up and lookin' good. Buttons at the bottom of the Window list allow you to perform actions as you would from the pop-up menu—**Tile**, **Cascade**, **Close**, **Show**, and **Hide**. In addition, you can display the **Settings** notebook of the selected object.

A **Filters** button allows you to remove items from the Window List. While there's not a wild-card method to remove, for example, all open folders, you can choose specific items, like Desktop, and have them not appear in the list.

My favorite Task Manager feature is the **Run** field. Here, you can type command line commands, like "e e:\my command.com" and click the **Run** button to start *command.com* with the command. And, Task Manager will save previously run commands, up to 20, in a list and allow you to replay them.

Object Navigator

Object Navigator is a cross between Window's File Manager and OS/2's Drives object. The left side of the Object Navigator screen displays the tree structure, while the right side displays the

contents of the folder. Everything displayed is an object and can be directly manipulated from within the window.

You can drag and drop frequently used folders to the **Fast Path** drop-down menu. Select the folder's name from the menu, and Object Navigator displays its contents. Because all the items in **Fast Path** are objects, you can move the folder—even to different drives—and **Fast Path** will keep track of the object.

Buttons across the top of the Object Navigator window make it easy to move, create, copy, shadow, and delete objects. People making the move from Windows will appreciate Object Navigator. Seasoned OS/2 users will probably prefer the speed of working directly from the Workplace Shell.

WorkPlace Shell enhancements

Some of Object Desktop's most compelling features are not new programs but how it has changed what we're used to working with. Object Desktop enhances folders and data files and makes little changes here and there that improve the overall flow of the Workplace Shell.

Globally, Object Desktop changes the minimize/maximize icons to a nicer, three-dimensional look and the scrollbar buttons to arrows. A **Close** button appears as an X icon next to the **minimize** button, allowing you to close almost any window with one click (the exceptions to this are Windows applications and the odd OS/2 program that doesn't use conventional window creation routines).

Folder objects include a **Status Bar** that immediately identifies the number of objects in the folder and the overall size of the folder. The **Status Bar** also displays the number of objects selected and the size of the selected objects. An enhanced frame makes the folder more attractive and makes it easier to grab the side of the folder's window for resizing.

Folders include an optional **Browse** mode, a memory-saving device when viewing multiple folders. In OS/2, each time you open a new folder, you're using more memory and putting more on the screen. With the OS/2 option of closing a parent folder, it eases the memory usage (and the clutter) but can make it inconvenient to reopen folders.

With Object Desktop's Browse, the contents of the open folder are replaced with the contents of the subfolder. For example, I opened the **Data** folder to reveal 30 documents and four folders. When I opened **Expense Reports** (one of the four folders in **Data**), the **Data** documents and folders were replaced with the **Expense Report's** four documents. Clicking the **Backup** Button (or pressing <Esc>) returned to the contents of the **Data** folder.

HyperCache and HyperDrive work to speed the display of a folder's contents. HyperDrive saves time by allowing Object Desktop to guess at the icons associated with the objects in the folder, instead of waiting for the Workplace Shell to read the icons from the extended attributes.

When I used HyperDrive, I saw an immediate speed increase in the display of folders with large numbers of objects. However, most of the objects had default icons, instead of correct icons. When enabling Icon **Read-Behind**, I could quickly see the folder contents with **best-guess** icons and the **real** icons filled in behind. I was quite satisfied with this and set it as the system default.

HyperCache is a little different. It stores the contents of a folder in RAM, allowing my large folders to open very quickly with the correct icon associated. I found the biggest benefit of HyperCache when used on a network folder that contains all our shared documents. For local folders, HyperDrive was just as fast, without the additional RAM usage of HyperCache.

Data files are augmented by Object Desktop's enhanced text editor. In

NPS Workplace Shell Enhancer

If you're interested in some of the sizzle of Object Desktop, without paying for the steak, there's a freeware utility that you should look for on your local BBS or FTP site. NPS WPS Enhancer, written by Team OS/2 Japan member Shinji "N.P.S." Takasugi, is an excellent utility that offers some of the cosmetic enhancements of Object Desktop and a couple of other goodies that Object Desktop lacks.

The overlapping features include the full-window drag and the extra close button on the right side of the window. Some of the NPS-only features are: being able to select text in a windows command line session, the ability to draw on the desktop with the mouse pointer, and (my favorite) customized window open/close animations. The customized window animations are the flashiest of NPS' add-ons, and, with version 1.80, the ability to add more custom window animations for the desktop user with CPU cycles to spare is even available.

While this may be all some users need in the way of Workplace Shell enhancement, I found that after using Object Desktop, NPS alone wasn't enough to satisfy me. The good part about these programs is that they both work well together. I found that using Object Desktop's close button and full-window drag, in conjunction with NPS' window animations, and command line text selection was the combination that all of my machines must have. An added bonus is that I can use Object Desktop's Task Manager to filter the NPS executable (NPS is a program, unlike Object Desktop, which is a collection of Workplace Shell DLLs) from my desktop's task list.

All and all, I heartily recommend NPS for anyone looking to make OS/2 a little snazzier, whether they want to spend any money for it or not.

—Alexander Antoniadis

In addition to the improved frame and a Status Bar, the text editor alters the menus of the OS/2 System Editor to be slightly cleaner and quicker to use, this time displaying line and column number and a notice if the file had been modified. The Find dialog is a great improvement over that of the System Editor. All menu items are available from the editor's system menu, including an option to remove the menu bar all together.

One missing item from the Enhanced Data File is an option for **Save As**. This makes it difficult to modify an existing text document and save it under a new name. As I was editing dozens of HTML documents, I found it inconvenient to use. I wanted to keep the current version and save the updates under a new name, quite impossible without a **Save As**.

Window Drag Mode, another Workplace Shell enhancement, changes how OS/2 displays any window when you drag the title bar. By default, OS/2 displays the outline of the window as you

move it. Only when you release the mouse button do you actually reposition the window itself. With Window Drag Mode enabled, the entire window moves as it does in Windows NT.

In testing this feature, I encountered glitches on my lower-resolution monitors (640x480, 256 colors). Dragging the Window List from the top of the screen to the bottom resulted in multiple title bars, one layered upon the other in a stair-step fashion, until I released the mouse button. On higher resolution monitors, this did not occur.

Overall, the Workplace Shell enhancements greatly improve both the appearance and the functionality of the OS/2 desktop.

Object archives

Object Archives let you work with compressed files without going through the steps of compressing and decompressing every time you use them. When objects are stored in an archive, Object Desktop does the compression for you.

Object Archives supports four com-

pression formats: ZIP (using Info-Zip), LHA (using LH/2), ZOO (using GNU), and ARC. All four programs are included as shareware with SDS Extras.

Creating an archive is easy. Object Desktop provides a template for each archive format. Drag and drop the template to create a new archive and then drop the objects—folder, data file, program—into the archive folder.

The Settings notebook for the folder allows you to specify a path for the archive utility or use the path that **SDS Extras** places in your *config.sys*. This allows you to choose different archive utilities for individual folders.

While dropping a file in the archive folder compresses it, you can decompress it in two ways: drag out of the folder or simply open the file directly from the archive folder. Dropping a file or folder into the archive compresses a copy of the original. Dragging from the archive creates an uncompressed copy. Therefore, using the drag-and-drop method to compress and decompress can result in multiple versions and copies of the document.

I had great success with using the LHZ and ZIP utilities. I dropped a number of DeScribe documents into archive folders. Double clicking on the compressed document started Describe with the uncompressed document loaded. Saving the document saved it in the archive, compressed. It's important to remember that compressed documents can't be opened from the File/Open dialog in your application. Although it appears as a folder on your desktop, an archive file is a file, not really a directory containing files.

The ARC utility included with **SDS Extras** is a DOS program. When adding documents with long file names to the ARC archive, Object Desktop returns an error that there is nothing in the document. Renaming the file to 8.3 allows the file to be compressed. ARC also dissociates the application from the file and attempts to open everything in the text editor. OS/2 users are

better off not using the ARC utility except when exchanging compressed files with DOS users.

Glee or flee

Object Desktop contains many components. Undoubtedly, OS/2 users will find that they favor some over others. Fortunately, Object Desktop includes an excellent installation and deinstallation that allows you to add and subtract features as you use them.

Overall, the enhancements to the Workplace Shell and OS/2 usability are well worth the price and minimal amount of drive space. The enhanced Window List, folder objects, and archiving utilities alone make it worth the purchase.

I will admit to being a bit disappointed with the number of small problems I encountered on my ThinkPad. While some, like the tracers with the Window Drag Mode, are directly related to my low-resolution monitor, others seem like oversights. However, with the fine reputation Stardock has developed for OS/2 applications, I don't hesitate to recommend Object Desktop fully. **OS/2**

Christine White writes and speaks about technology around the world. She can be reached at 71075.2673@compuserve.com.

Resources:

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OS/2 Warp as a Communications Center

BY WAYNE RASH, JR.

IBM's release of the AttachPak for OS/2 Warp Connect shows that it's no longer satisfied with simply challenging Microsoft's Windows NT, but in moving well beyond it. While both Windows NT and OS/2 Warp are credible communications platforms, the AttachPak adds capabilities that Microsoft just can't match. The result is that, for many corporations, OS/2 Warp Connect can become the do-everything answer to communications needs.

Of course, the question remains as to whether the functions that OS/2 Warp Connect and the AttachPak offer are the functions you need; the chances are good that they will be. IBM has collected a grab bag of communications and related software, put them all on a CD-ROM with an integrated installation program, and is selling the disk as a sort of one-stop solution for your connectivity needs.

For most companies, some of these communications tools will be more useful than others. For example, unless you have an IBM mainframe, you probably won't need SNA- or 3270-based applications. In addition, one of the products listed as being part of the AttachPak doesn't really come with it at all.

What's there

The products in the AttachPak can be grouped into three categories. The first group consists of products that are mainframe solutions intended to be used in the corporate environment. The second group is made up of enterprise networking tools, while the third is aimed at remote computing users.

The two mainframe solutions are Personal Communications/3270 for OS/2 and Communications Manager/2

SNA Application Environment. Personal Communications/3270 gives you an IEEE 802.2-based 3270 terminal emulation for up to two sessions. The terminal emulator works with network transports already included with OS/2 Warp Connect.

The CM/2 SNA Application Environment is a subset of the full Communications Manager/2 product. If your users only need Systems Network Architecture applications support, including APPC, this product fills the bill. While it's not as complete as the commercial release of CM/2, the cost is dramatically less, and it offers the functions that many customers want.

The enterprise communications tools are likely to be useful to nearly everyone who has access to a network. They include AnyNet Sockets for OS/2, a DCE client, a NetView startup application, and Lotus Notes Desktop. A single-user version of System Performance Monitor/2 is also included.

The AnyNet Sockets for OS/2 is potentially useful for companies that want the advantages of being able to use the popular Sockets interface, but don't want to run TCP/IP. This product lets you use Novell's IPX, as well as NetBIOS and SNA as transports instead. This option can have important plusses in those network environments where the cost of changing transport protocols could be a show-stopper. This way, applications that need a Sockets interface can have one and will never know that they're not using TCP/IP. Incidentally, this particular product is reasonably easy to set up and get running.

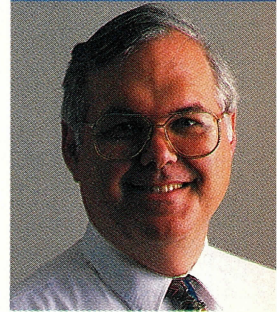
The DCE client lets OS/2 Warp Connect users be part of IBM's Distributed Computing Environment. This product

works in most enterprise environments supporting client/server and other types of distributed applications. The NetView startup client, by contrast, makes software distribution easier through improved access of the Distribution Manager/2 software distribution service.

The System Performance Monitor/2 is a single-user version of the software currently shipped with IBM's Netfinity and will also be delivered with OS/2 Warp Server when it starts shipping in early 1996. Unlike these versions, which let you monitor both the platform on which the software is installed as well as computers elsewhere on the network, the version delivered with the AttachPak is only for a single station. While this probably is done to reflect the package's single-user license, it does limit its usefulness. Still, Performance Monitor/2 does tell you a great deal about what the demands on your computer are at any given time, and it gives you a constantly updated graph of system resources.

Finally, the package includes Lotus Notes Desktop, which is presented as one of the products in the AttachPak—but really isn't. IBM includes a brochure with the license information that lets you use the Desktop functions of the existing copy of Lotus Notes Express that came with OS/2 Warp Connect. All your system administrator needs to do is change a setting in Notes, and the same software that was appearing as Notes Express becomes the Notes Desktop.

Unlike the enterprise focus of the other products, the last two parts of AttachPak are aimed at mobile workers. Mobile File Sync lets you keep the information on two computers synchronized even when you use them separately. You can use a LAN Server work-



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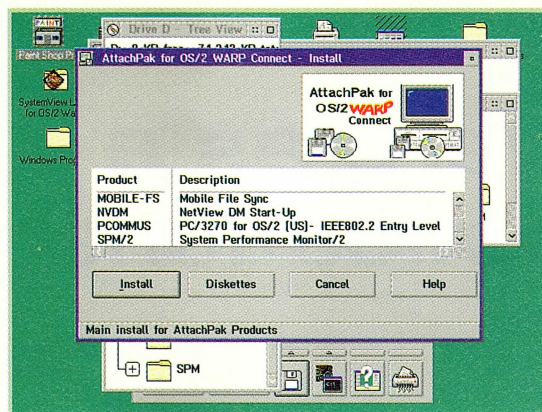


Figure 1: WPProgram Settings Notebook.

station while it's detached from the LAN, and then when you're reattached, the files on the two computers will be synchronously updated.

In one sense, the AttachPak's Dial In Access to LANs competes with Microsoft's Remote Access Server (RAS) because it allows a remote user to dial in to your computer to attach to the LAN and use LAN resources. For example, when you're traveling you can call your office PC and get access to your files, whether they're on the PC's hard disk or on the network. The difference is that while Microsoft's RAS works with a modem and a serial port, DIALS requires the IBM 8235 dial-in hardware server platform.

But is it worth it?

As you can see, few potential users of AttachPak are likely to use all of it. This is partly because the AttachPak is a random collection of connectivity tools and partly because most companies have already found solutions to some of what the AttachPak promises to do. On the other hand, the AttachPak costs only \$209, so even if you only need a couple of the features, it's probably worth it. The other tools are a bonus even if you only use them occasionally.

It's worth remembering that the AttachPak is a collection of utilities that weren't really designed to function as part of a suite. For this reason, when you install the package you can see that the installation procedures vary greatly. Some install programs are just batch files that copy information to the hard disk. Others are sophisticated packages that determine system information, change configuration files, and back up the software they update. Fortunately,

the installation software works properly and allows you to configure the software easily.

Even though the existence of an integrated installation program might give the impression that the packages themselves are somehow integrated—they're not. These are stand-alone connectivity tools, and you can install or not install them as you see fit. Once installed, they don't appear together

on the desktop; some are in an AttachPak folder, while others are in folders of their own.

These tools, for the most part, are only portions of more comprehensive packages that IBM has available. This may not matter to you if you need exactly what's offered in the AttachPak, but you should check the tools you need carefully to make sure you're getting what you want.

Having said all of that, the AttachPak really is a good deal, even if you only need part of what's there. It does add much functionality to OS/2 Warp Connect, and more importantly, it lets you take advantage of the potential functionality that's frequently just out of reach. If you need these functions and want OS/2 Warp Connect to be your communications console, then the AttachPak might be well worth buying. **OS/2**

Wayne Rash, Jr. is a contributing editor and columnist for Communications Week. He's based in Washington D.C. and edits technology sections for The Washington Post. He can be reached at rash@access.digex.net or CompuServe 72205,221.

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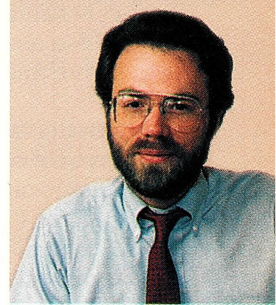
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Juggling Methods: How Multitasking Works

BY MARK MINASI



For years you've heard that OS/2 has one of the best multitasking engines available in the PC world—it's true. However, you might not know exactly how OS/2 accomplishes such multitasking magic. Obviously, most PCs have only one processor and, if they had more, most versions of OS/2 couldn't use them anyway. So, how does one microprocessor simultaneously perform multiple tasks?

At its base, OS/2 does what computers have done for a long time: it leverages the fact that computers work in microseconds, whereas you and I work in milliseconds. (Your fastest nerve impulses travel a bit under 200 miles per hour. Assume that the distance from your optic nerve to your visual cortex is about one foot; 200 miles per hour is about 300 feet per second. So, figure you can get a visual image about three milliseconds after it happens.) The trick of multitasking is that even though the computer does only one thing at a time, time goes by much faster for the computer, in that it can do multiple jobs within our three-millisecond perceptual clock tick. (By the way, that three millisecond number isn't scientific, so please don't plague me with e-mail about this and that study contradicting me; I very seriously doubt anyone could dodge 300 tennis balls thrown per second, much less be able to distinguish that many projectiles. Our actual interval is probably even smaller, since you can't see the difference in flicker on a computer screen above 70 screen refreshes per second.)

Round robin

In its simplest sense, OS/2 uses round-

robin multitasking. To see how it works, consider this example.

Suppose you're running two programs at the same time—two copies of a spreadsheet program. In the first one, you're sorting a large table of figures. In the second, you're recalculating some huge spreadsheet chock-full of logarithms and trigonometric functions. In both cases, these programs needn't access the disk, the printer, the network, or perhaps (if they were minimized) not even the screen; both are CPU-bound programs that you might say are in their own private Idahos.

In this case, the CPU has more than one thing to do, and so it handles it much the same way you would when doing two equally important tasks: you work on the first task for a while, then you put that away and move on to the second task, eventually returning to the first task, and so on. But how much time should you devote to a task before temporarily putting it aside? In multitasking terms, this amount of time is called the timeslice.

You can control OS/2's timeslice with a setting in the *config.sys*. By default, there won't be a **TIMESLICE**= command in your *config.sys*, so add one if you want to play around with it. The value is in milliseconds, and the minimum value that you can enter is 32.

Pick a time, any time

Should a timeslice be big or little? Neither. You want your multitasking system to be smooth and fast. Now, what happens if you set the timeslice to something large, such as, a minute? If you were using a word-processing program in the foreground, and per-

haps a communications program, such as ftp, in the background, you would want your ftp **get** command to continue sucking down bytes in the background while you merrily type away in the foreground. However, you set the timeslice to one minute. The word processor then gets the full and undivided attention of the CPU for one full minute. As soon as you press a key, the word processor responds—a fast system, which is what we wanted. After a minute goes by, though, the ftp program gets the CPU's full and undivided attention. What's the word-processing program doing during that minute? Nothing. You press a key and nothing happens. Press enough keys and it'll make annoying beep noises at you. After another minute has gone by, the CPU's attention is drawn back to the word processor, and all those stored-up keystrokes squirt onto the screen.

Now, could you work with a one-minute multitasker? Of course not. First of all, the ftp program would crash, as it needs regular attention. And like most communications programs, it doesn't need the CPU for very long. When it needs it, however, it needs it *now*. Even worse, if you were running seven programs in the background, then each one of them would get a minute, meaning that you'd see one minute in the foreground for the word processor, then seven minutes of inactivity.

How about a second? Is a second too long? Would you notice a word processor that didn't pay attention to you for a second? Sure, if you think a second is a short period of time, stick a needle in your eye for one second—it's a long time. Hmm...sounds like the answer

is a very short time period, since a short time period will be really smooth. If we set the timeslice to a miniscule value such as one millionth of a second, perhaps all would be well—not true.

Mornings and afternoons

Think back to my example of doing two different tasks. Suppose you decide to spend mornings on task number one and afternoons on task number two. What exactly is involved with any given day? Well, you'd probably have a folder for task one and a folder for task two. First thing in the morning, you'd open up folder one and spread it out on your desk, reminding yourself where you left off yesterday. You'd work for a few hours and get ready to switch to task number two. Let's say you do that by gathering up all relevant items to task number one, stuffing them in task number one's folder, and putting that folder away. Then, you get the task number two folder and spread out the stuff in it all over the desk, re-familiarizing yourself with the task at hand. At the end of the day, you'd gather up task number two's papers and put them in its folder.

For the bulk of the day, you worked on the two projects, but let's focus on the time spent going from one project to the other—the switching time. Switching time takes the same amount of time whether you're about to execute a four-hour timeslice or a one-second timeslice. For the sake of argument, suppose it takes you one minute to switch tasks. Now, suppose you set yourself a timeslice of one minute. That would mean that you'd spend a minute getting ready to work on task number one, then work on that task for a minute. Then you'd spend a minute putting away task number one and setting up task number two, working on task number two for a minute. So, if you set your timeslice to a minute, you only spend half your time doing actual work, and half your time doing system overhead. In contrast, if you set your timeslice to four hours, then you switch for a minute and work for 240 minutes—

Listing 1: REXX program to test your time slice.

```
COUNT.CMD:
/* make sure to enter this */
/* comment, or this won't work! */
/* count.cmd by minasi */
if arg()=0
then countto=1000
/* if they forget the parm, */
/* count to 1000 anyway */
else do
  arg x
  parse var x countto
end
/* find out when we started */
a=time('r')
line=0
do countto
  line=line+1
  say "Now at line " line
end
/* how long did it take? */
b=time('e')
tottime=b-a
say "Took " tottime "seconds."
```

only spending less than one percent of your CPU time on overhead.

Just right

Timeslices are similar to the beds that Goldilocks found—too hard, too soft, and just right. In a perfect world, we could then do a calculation similar to the following: assume first that you don't want to spend any more than 1% of your CPU's time switching, and second, that you don't want a timeslice any larger than, say, three milliseconds. You'd have to know the amount of time that OS/2 required to switch from task to task, then 10 times 100 is one millisecond, our prospective timeslice. If that prospective timeslice is less than three milliseconds, then we'd use it. Otherwise, we'd have to make a choice between overall speed (which argues for larger

timeslices) and smoothness (which argues for smaller timeslices).

Now, I can't provide switching times because they are very, very specific to your CPU. Part of what makes a 486 different from a 386, and a Pentium Pro from a Pentium, is how it switches tasks. On top of that, different clock rates mean that instructions get executed in a given amount of time, hence, greater or lesser switching time. Furthermore, my ideal timeslicing model is somewhat shot down by the minimum possible value of 32 ms. Where that comes from, by the way, is that back in the OS/2 1.0 days, the 8MHz 286s, that we were running OS/2 1.x on, took too long to switch to allow 32 ms. In contrast, any 486 33MHz or faster will, based on my experiments with other operating systems, support a one-millisecond timeslice without any trouble.

Fooling around

By now you're probably itching to play around, so here's a little REXX program that you can use to experiment with timeslices (Listing 1). All it does is count to a big value, timing how long it takes to get to that value. Additionally, it shows you how it counts. The way I use it is to open up two command prompt windows on my desktop, type: "count 1000" in both screens, but don't press <Enter> until you've got the command in both windows. Then, quickly press <Enter> in the first window, click to the second window, press <Enter>, and (this is very important) click away to something else. If you don't, the window with the focus will get special treatment. Try different timeslices and see how smoothly (or not so smoothly) OS/2 shifts between the windows. Have fun!

OS/2

Mark Minasi has been a consultant and educator in the fields of advanced PC operating platforms and PC technology since 1984. He is a contributing editor for Compute, BYTE, and OS/2 Magazine. You can contact him at CompuServe 71571,264 or via the Internet at mark@smtphost.mmco.com.

End Notes

End Notes, cont'd from p. 80

because of the management changes described by Krantz. He does not discuss the subsequent Warp versions, but it's clear that IBM now has the edge over Microsoft in developing and launching quality software in a timely fashion.

An early decision in the migration to client/server was that all 2,700 PCs and workstations at Boca Raton should use the same client-operating system. I'll give you one guess as to which OS received the nod. Time's up. Who said CP/M? Kindly leave my column. Although the project favored the "Use What We Sell" approach for both hardware and software, IBM products were not chosen blindly. Krantz takes us through the criteria and deliberations for each element in the project. Not the least significant, in the selection of OS/2 as the client OS, was that IBM Boca Raton is the home of OS/2 development. "This led to key advantages in support, quality, and (most important) acceptance," (p. 93). I find it hard to quibble over this decision. It adds a fresh slant to the old DP Manager's defense: "They can never fire you for ordering IBM." The client hardware includes PS/2s, PS/Value Points, and RS/6000s. The servers include RS/6000s and ES/9000s running AIX and OS/2.

Chapter 3 is devoted to the choice of client software, which Krantz divides into three categories, personal, team, and enterprise applications. Again, we follow the selection strategies and gain valuable insights applicable to all client/server implementations. The key decision for Boca Raton was to move from OfficeVision/VM to Lotus Notes. Lotus SmartSuite was also preferred for word processing (Ami Pro for OS/2), spreadsheets (Lotus 1-2-3 for OS/2), and business graphics (Free-lance for OS/2). Clearly, Lotus profited from its long-standing support of OS/2—and possibly some seeds were sown leading to the subsequent acquisition of Lotus by IBM. In any case, the "Use What We Sell" slogan now seems to apply throughout the project, and we have a well-heeled cobbler with a well-shod family. Lou Gerstner has called this marriage of OS/2 and Lotus groupware the shared vision of team

computing that drives the new IBM-Lotus partnership.

One blurb on the front cover claims that *Real World Client/Server* is "The Soul of a New Machine" for the client/server world." I think this comparison is unfair to both Steve Krantz and Tracy Kidder because the two books differ widely in aim, content, and style. Kidder is the outsider revealing for the lay reader the dramatic agonies of developing a minicomputer. Krantz, by contrast, is the expert insider addressing his peers. His detailed case study serves primarily as a practical blueprint for successful migrations to client/server. **OS/2**

Footnote

¹The official Library of Congress designation combines the title and subtitle, which is a total of 115 characters. Designers of bibliographic databases hate this lack of titular pith. Still, it was harder in the old tab card days when book titles were typically truncated to the first twelve characters.

Stan Kelly-Bootle started computing on EDSAC I at Cambridge over 40 years ago and has written at least 11 books. His "Devil's Advocate" column in UNIX Review has been running since 1984. His latest book is Computer Contradictionary (1995, MIT Press). Stan welcomes e-mail via CompuServe 70323,1560 or Internet skb@crl.com. You can also take a look at his Web home page: <http://www.crl.com/~skb>.

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Real World Client/Server

BY STAN KELLY-BOOTLE

Is this a coincidence or an emerging tradition? One year ago, to the very day, in this very column, I reviewed the *Essential Client/Server Survival Guide* by Robert Orfali, Dan Harkey, and Jeri Edwards (VNR). And now, assuming you've had time to digest that masterly introduction, I propose a solid, practical sequel: Steve Krantz's *Real World Client/Server* (Maximum Press). As the title suggests, we have moved from speculation, theory, and abstract cost-justification to client/server in action. The subtitle is even more informative: "Learn how to successfully migrate to client/server from someone who's actually done it!"¹ This should silence the cynics who see *real world client/server* as one or more oxymorons.

Steve Krantz was the project leader for the IBM Boca Raton client/server migration project, and his book tells the inside story of the massive re-engineering of IBM's business and information systems (IS) models at Boca Raton in 1993-94. The migration was indeed successful, and the author provides an invaluable blueprint for all IS professionals faced with similar challenges. Bottom-line watchers will be interested to read that the IBM Boca Raton 1995 Plan sets the overall goal of a 50% reduction in IS expenses, although in general, client/server can be difficult to justify on a simple cost basis. Krantz takes you step-by-step from the formulation of the business-re-engineering model to the creation of a client/server infrastructure. He covers every aspect of hardware and software selection and implementation, with ample warnings of the potential pitfalls.

Reflecting the new open Big Blue spirit, the author is candid concerning the problems of the traditional IBM management structures that prompted this large-scale re-engineering. For those of us who were with IBM in the

**IBM now has the
edge over
Microsoft in
developing and
launching quality
software in a
timely fashion.**

1950s, such public confessions are particularly riveting. Ironically, although IBM Boca Raton was the birthplace of the original PC (1981) and the center for OS/2 development (starting around 1983), the site's predominant information technology remained mired in mainframe centrality, reflecting the rigid, top-heavy management ethos of T. J. Watson, Sr. Of course, you could say that IBM's bread-and-butter over the years has been selling this very model to like-minded corporations worldwide. Both the cobbler and the cobbler's children, if not ill-shod, were rather ill-equipped for the changing IS

needs that have fueled the move to client/server architectures. Krantz traces this evolution back to W. Deming's information-sharing and quality-control plans that reinvigorated Japan's industries in the '50s and '60s. The vital point, which makes this book essential reading for both the rightsizers and the rightsized, is that client/server has evolved as the complex interaction between the new management strategies ("empowered, information-sharing teams") and the new data-processing technologies ("workgroups, networks, scalable distributed databases, and multiple-platform processing"). The author rightly stresses that we should not treat client/server as a general panacea and carefully rehearses the pros and cons. Nor can we write-off the mainframe, which remains the preferred solution for many high-volume, transaction-processing applications, especially where security, a notorious client/server weakness, is a major factor.

Of particular interest to *OS/2 Magazine* readers is the chapter dealing with the stormy history of the OS/2 development process at Boca Raton. The section headings "Waterfall to Chaos" and "Chaos to LIT (Line Item Tracking)" sum up the early part of the story. Krantz admits that IBM was too slow in relinquishing the traditional waterfall software development model. This fact contributed to the 12-month delay in shipping OS/2 2.0, by which time (March 1992) the more nimble Microsoft had gained a clear marketing edge with Windows. The development of OS/2 2.1 (shipped June 1993) went more smoothly

End Notes, cont'd on p. 79

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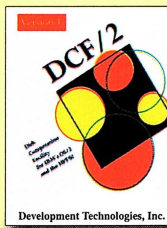
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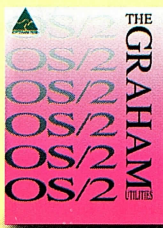
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The Graham Utilities™



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Dr. Mike Kogan:

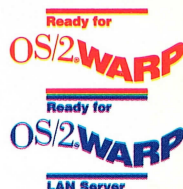
Lead Architect of OS/2 2.0
Author: The Design of OS/2

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